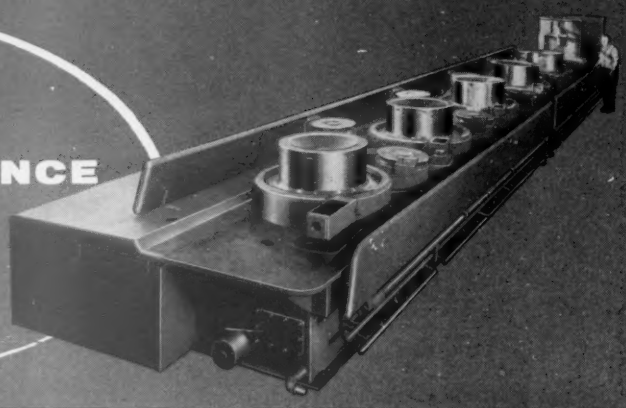
WIRE AND WIRE PRODUCTS

JANUARY 1958

VAUGHN®

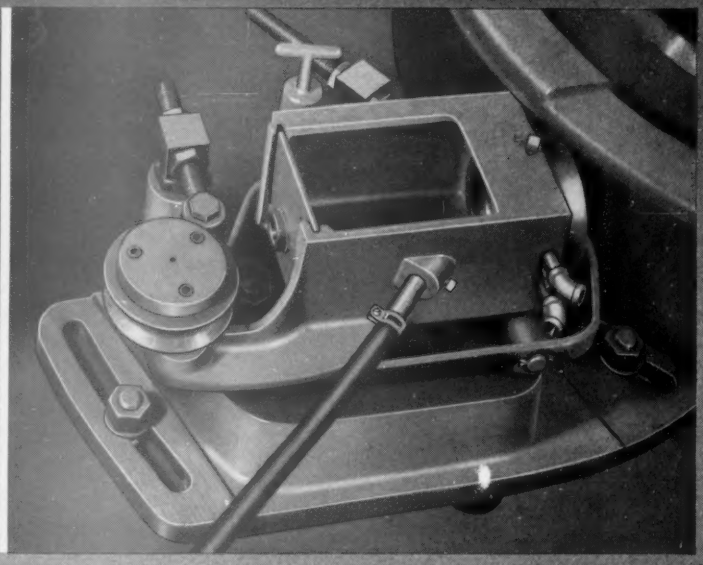
MOTOBLOX® PERFORMANCE

is built by features like this



WET OR DRY CASTING DIE-HOLDER

Standard on all VAUGHN MOTOBLOX



One of the many refinements found on VAUGHN MOTOBLOX is this Die-Holder for wet or dry lubricant. Its universal adjustment for casting; built-in, water-cooled, bronze die adapter; and guide sheave for taking bow out of wire make it truly a deluxe feature—yet *standard equipment* on your Motoblox. ● Do you have the complete Vaughn Catalog? Free on request.

The VAUGHN Machinery Company

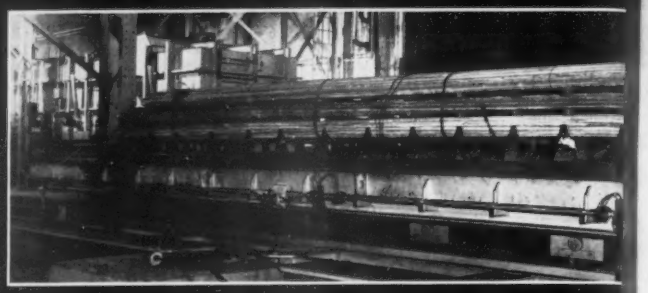
Cuyahoga Falls, Ohio, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys

"Quick on the Draw!"

" Wire + Wire Prod.
See Sample 2

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION



A thirty-foot straight bar furnace in operation at Youngstown Sheet and Tube's Briar Hill Plant.

Lee Wilson Merchant Bar Annealing System

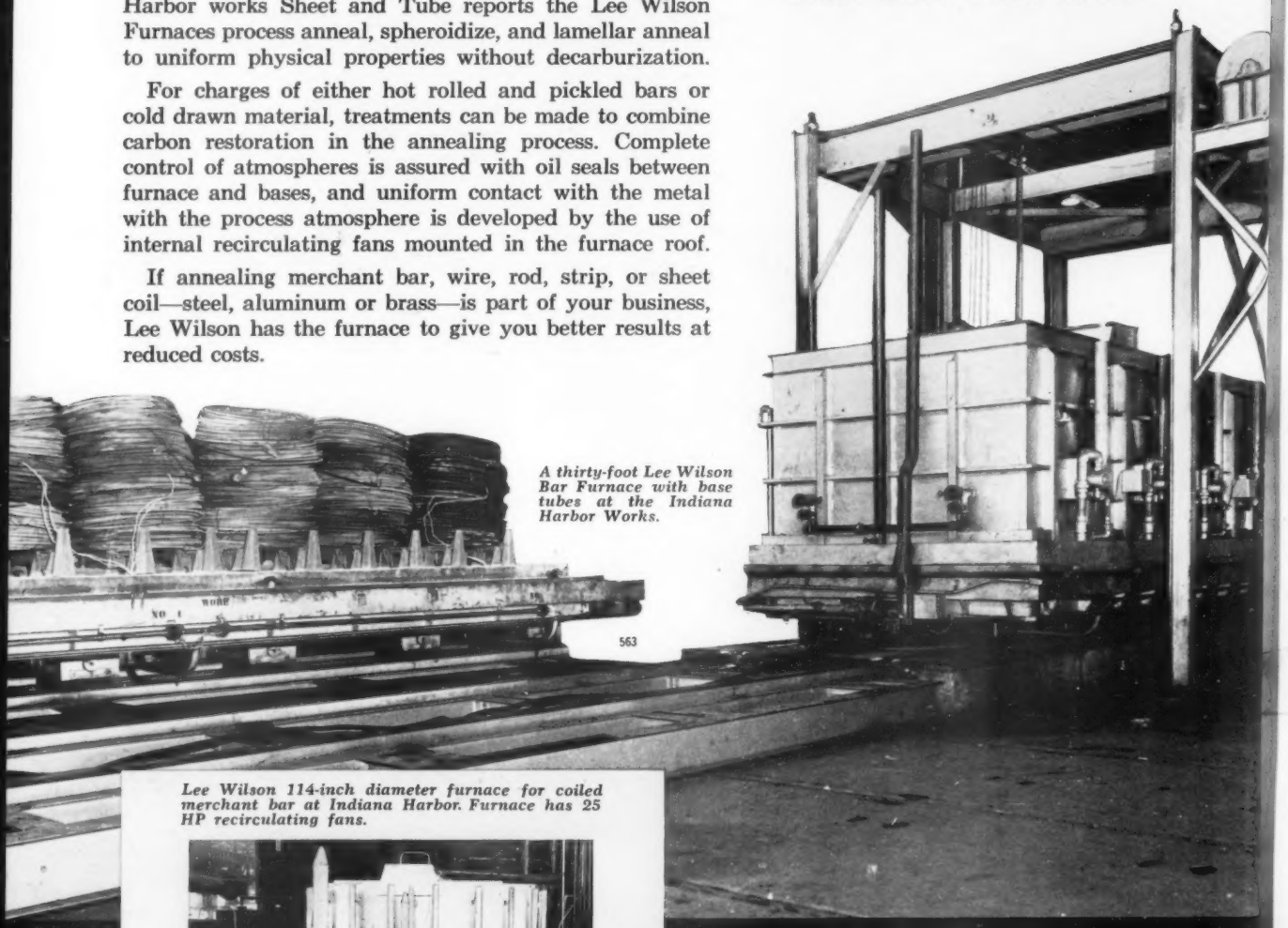
improves properties, finish...reduces costs

. . . at two Youngstown Sheet and Tube mills

FOR annealing merchant bar in coils and long straight lengths Youngstown Sheet and Tube found Lee Wilson Radiant Tube Fired, Gas Tight Furnaces deliver the desired results. In both their Youngstown and Indiana Harbor works Sheet and Tube reports the Lee Wilson Furnaces process anneal, spheroidize, and lamellar anneal to uniform physical properties without decarburization.

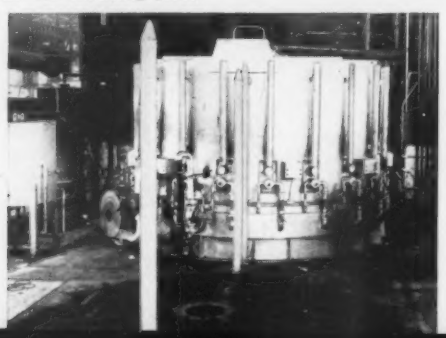
For charges of either hot rolled and pickled bars or cold drawn material, treatments can be made to combine carbon restoration in the annealing process. Complete control of atmospheres is assured with oil seals between furnace and bases, and uniform contact with the metal with the process atmosphere is developed by the use of internal recirculating fans mounted in the furnace roof.

If annealing merchant bar, wire, rod, strip, or sheet coil—steel, aluminum or brass—is part of your business, Lee Wilson has the furnace to give you better results at reduced costs.



A thirty-foot Lee Wilson Bar Furnace with base tubes at the Indiana Harbor Works.

Lee Wilson 114-inch diameter furnace for coiled merchant bar at Indiana Harbor. Furnace has 25 HP recirculating fans.

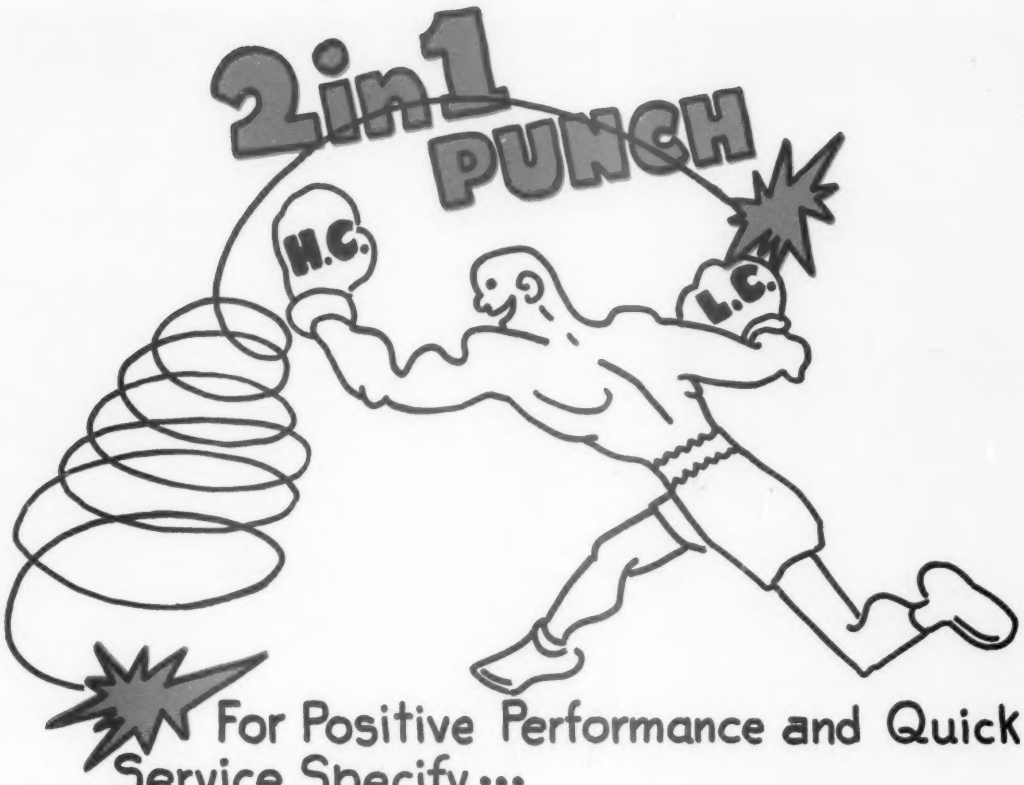


Lee Wilson* ENGINEERING COMPANY, INC

2003 WEST LAKE ROAD • CLEVELAND 16, O

HIGH CONVECTION ANNEALING FURNACES

MAKE THE BEST METALS BETTER



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"America's finest Wire Drawing Lubricants"

HAVE YOU INVESTIGATED

Standard 55?

More Rope Wire Is Drawn Thru Standard No. 55 Than All The Rest of the Wire Drawing Lubricants Combined.

Standard No. 55 Has Numerous Other Splendid Applications—May We Show You Why?

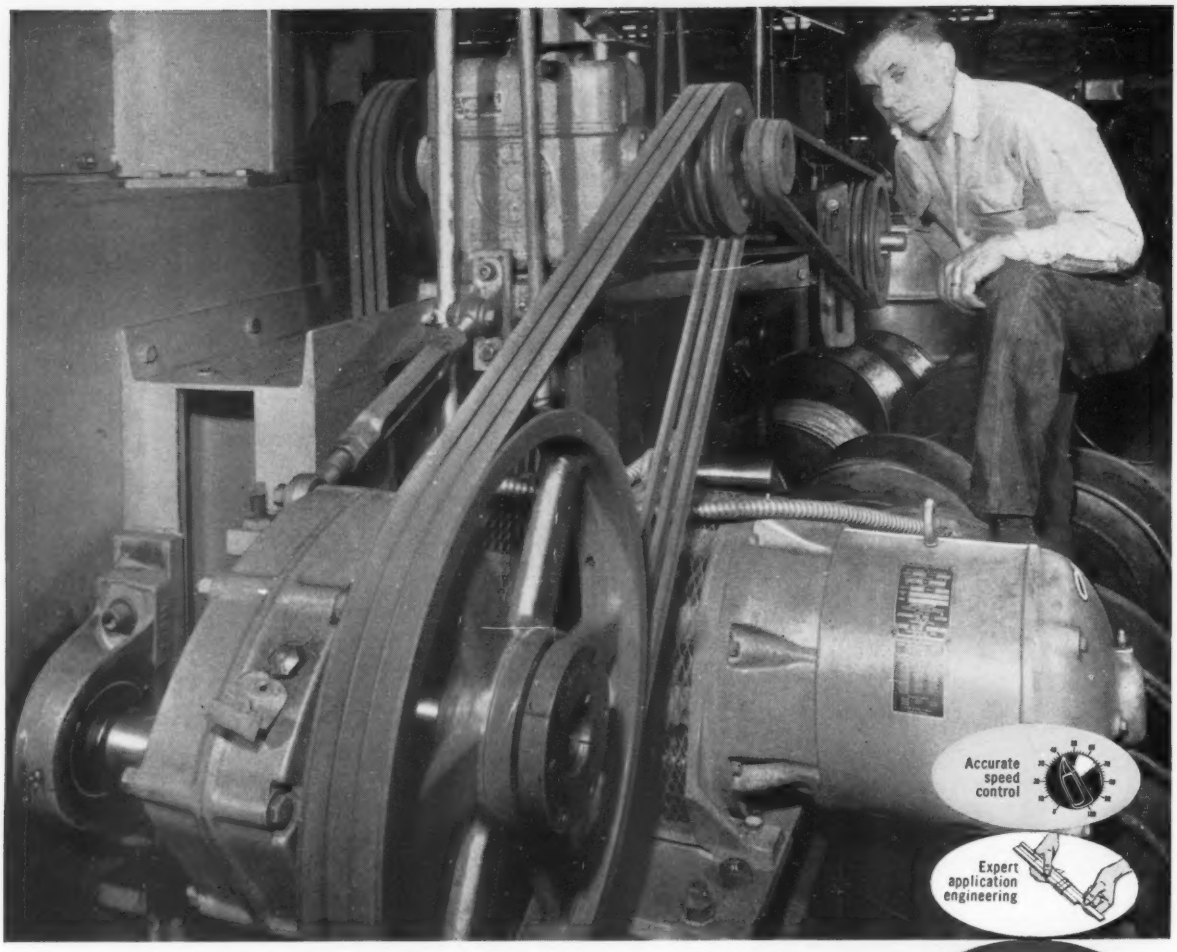
Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

Standard Industrial COMPOUNDS CO., INC.

FRANKFORT, ILLINOIS

(A suburban Chicago area city)

TELEPHONES: 2131 — 2141



Louis Allis drives double production at Central Cable Company

Ajusto-Spede® drives improve extruding operation — cut costs 75% — slash rejects 90%

Central Cable Company, of Freeport, Illinois, is a major manufacturer of utility cable. In recent years they decided to improve their cable insulation by going to the extrusion process.

To power their extrusion lines, they found that of all the drives available, Louis Allis Ajusto-Spede® A. C. drives offered the greatest flexibility and precise speed control. Result: production increased 100% . . . manpower costs dropped from $240 to $60 per day . . . rejection rate because of improper insulation dropped from 10% to less than 1%.

Adjustable speeds from 0 to 1400 fpm permit coating of varying cable sizes without changing mechanical set-up. Precise "one-dial" master speed control assures positive speed relation between extruder, capstan, and takeups—permits uninterrupted processing — maintains proper wire tension from initial feed through windup on shipping spools.

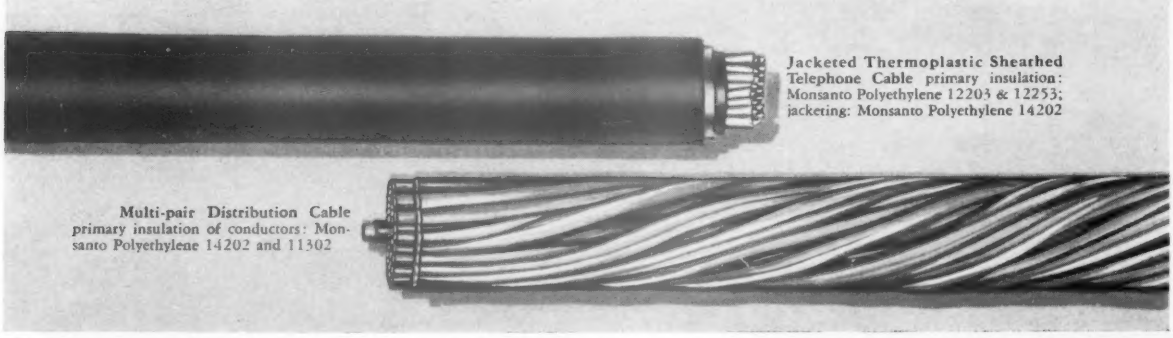
In addition, Louis Allis drives are controlled by one potentiometer, eliminate need for ac-dc converter. Equally important, the Louis Allis drives at Central Cable Company have not had a single breakdown since their installation in 1948 — nor have they required replacement or repairs of any kind.

For modernizing — or a new installation — consult Louis Allis *first*. Contact your nearby Louis Allis District Office or write to The Louis Allis Company, 451 East Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

THE MESSAGE IS: MONSANTO



Jacketed Thermoplastic Sheathed Telephone Cable primary insulation: Monsanto Polyethylene 12203 & 12253; jacketing: Monsanto Polyethylene 14202

Multi-pair Distribution Cable primary insulation of conductors: Monsanto Polyethylene 14202 and 11302

for your reliable "single source" of **polyethylene** *wire and cable insulating compounds*

For primary insulation, for jacketing, for steel support wire insulation—every one of the expanding series of Monsanto Polyethylene insulating compounds has been formulated for extrusion efficiency, great mechanical strength, and electrical requirements to fit your specific needs.

Call your local Monsanto representative for the complete story on how Monsanto Polyethylene can meet end-use performance requirements . . . or write for complete technical data and other information to Monsanto Chemical Company, Plastics Division, Room 2015, Springfield 2, Massachusetts.

Monsanto

DRAW IT FAST

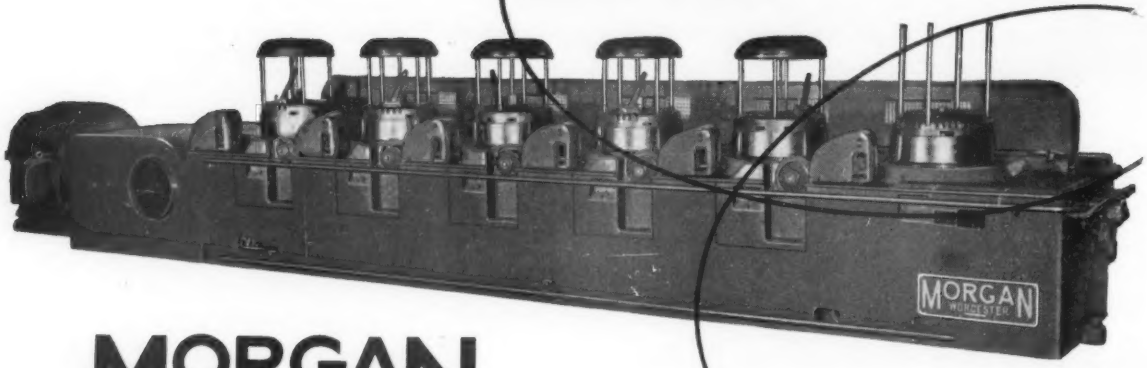
No-slip storage principle and air-cooling permit speedy drawing.

DRAW IT COLD

Exclusive air-cooling method removes heat from wire—insures meeting exacting specifications.

DRAW IT ON MORGAN-CONNOR

WIRE DRAWING MACHINES



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WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 33 January, 1958 No. 1

Designated as Official Publication By The Wire Association

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On Over 100 Sizes of

FLANGED STEEL TRAVERSES

Made as light as 18-gage steel in sizes from 12″ to 56″ in diameter and from 6″ to 48″ in length.

Plain, painted or hot dipped galvanized finish meets requirements for plain or coated wire and cable.

Republic Steel Traverses are lightweight, strong, durable, easy to assemble. Send coupon for details.

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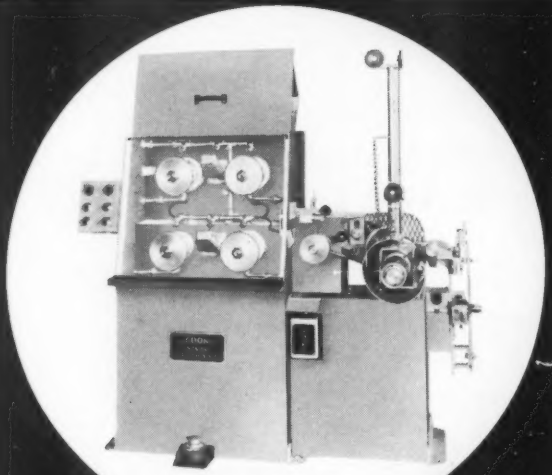
COOK WIRE MILL

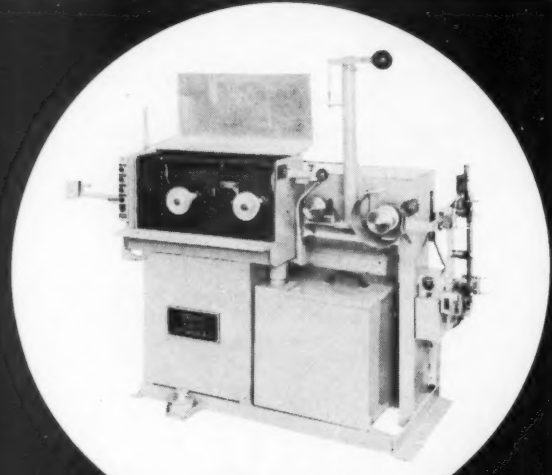
for money-saving, high speed wire production



MODEL F-31

SPECIFICATIONS

Maximum Wire Entering Size	#14 B&S Gauge
Finished Wire Size	#26 to 34 B&S Gauge
Operating Speed	5,000 ft./minute
Maximum Number of Dies	16
Number of Drawing Shafts	4
Size of Die Case	1" x ½" thick
Motor Size	15 HP
Spool Capacity	40 to 90 lbs.
Spool Flange Diameter	8" to 12"
Spool Traverse	6" to 8"



MODEL A-9

SPECIFICATIONS

Maximum Wire Entering Size	#24 B&S Gauge
Size of Finished Wire	33-44 B&S Gauge
Average Operating Speed up to	4,000 ft./minute
Maximum Number of Dies	9
Maximum Die Case	1" x ⅜" thick
Number of Drawing Shafts	2
Motor Size	up to 3 HP
Spool Capacity	10 to 20 lbs.
Spool Diameter	6"
Spool Traverse	4¾"
Floor Space	4'0" x 2'½"

From string-up to finished wire, every step in the operation of a Cook Wire Mill saves time, speeds production. Used individually or in combination, these Cook Wire Mills help you produce medium-fine and extra-fine wires at exceptionally low cost.

See what low cost, high speed production really is. Ask for complete details on Cook Wire Mills today.

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TORONTO, CANADA

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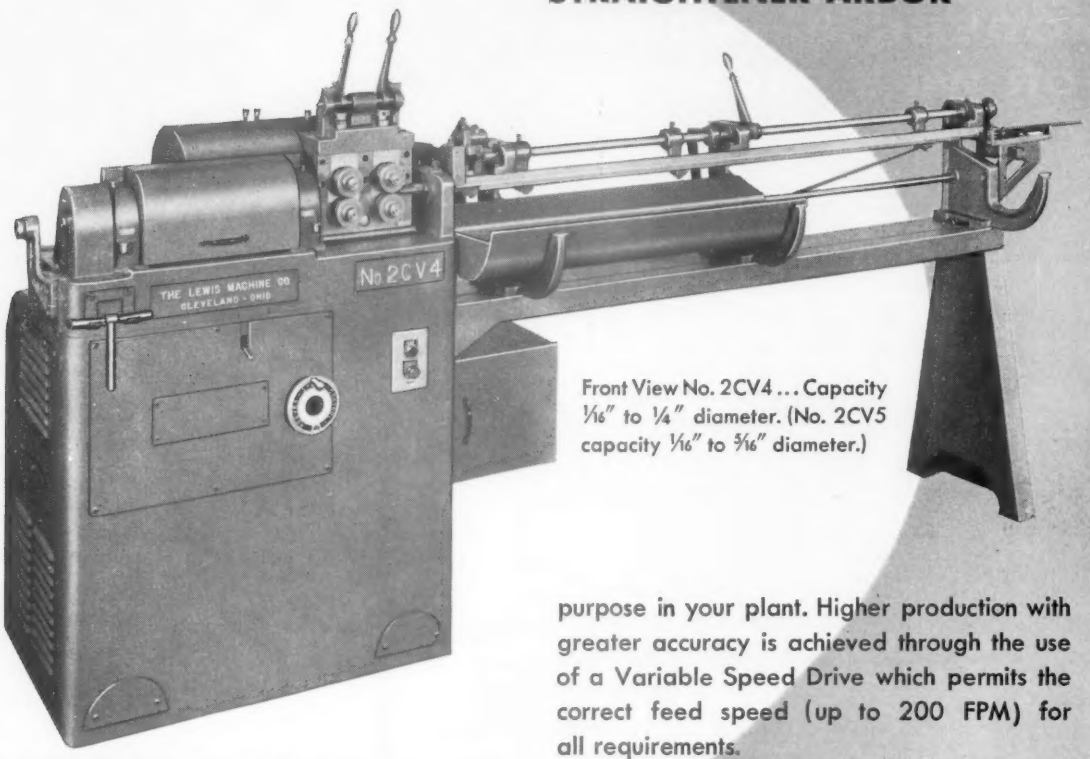
THE NEW **LEWIS** *Convertible*

AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINES WITH VARIABLE SPEED DRIVE AND DUAL-CENTER STRAIGHTENER ARBOR



Front View No. 2CV4 ... Capacity 1/16" to 1/4" diameter. (No. 2CV5 capacity 1/16" to 5/16" diameter.)

* The new Lewis No. 2CV series is equipped with our Dual-Center Rotary Straightener Arbor and can be quickly converted to handle shapes by installing our interchangeable Roll Straightener.

This convertible feature introduces a new flexibility in wire straightening and cutting operations ... one machine can serve a double purpose in your plant. Higher production with greater accuracy is achieved through the use of a Variable Speed Drive which permits the correct feed speed (up to 200 FPM) for all requirements.

The outstanding feature of this series is the DUAL-CENTER STRAIGHTENER ARBOR (Pat. Pending) for round wire. This feature increases the range of the machine and makes it possible to precision straighten small diameters below the capacity of other machines.

Other models available to handle .012" to 1" diameter, as well as shapes.

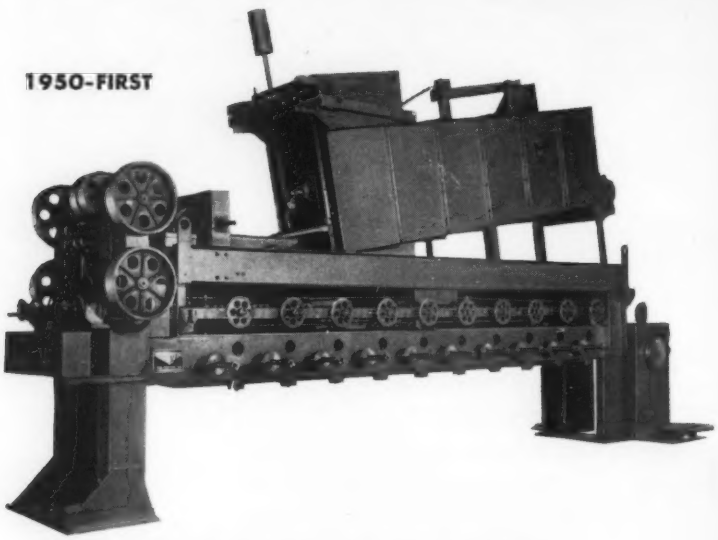
THE LEWIS MACHINE COMPANY

3441 East 76th Street • Cleveland 27, Ohio • A Division of Curtis Mfg. Co.

PROVEN FIRSTS

MODERN PRINCIPLES FOR WIRE PROCESSING

1950-FIRST

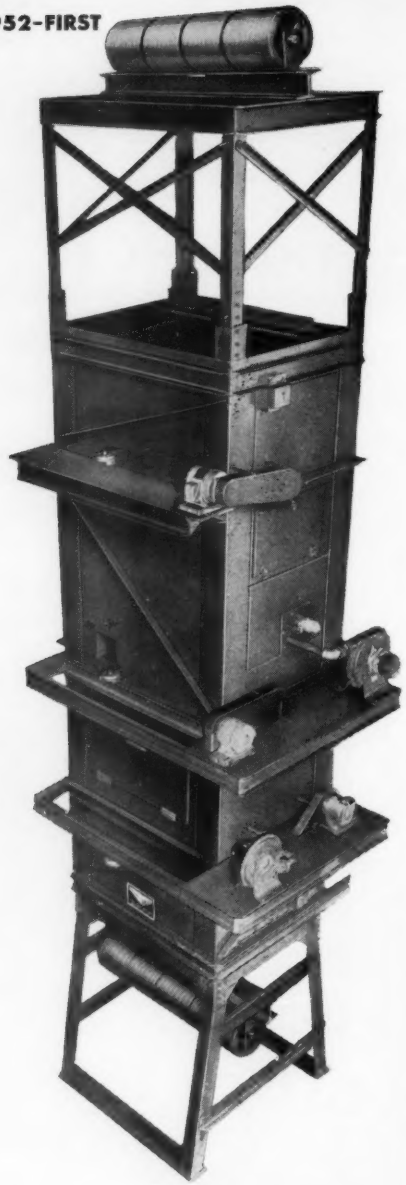


SELF-GENERATING ATMOSPHERE ANNEALERS

1950—FIRST to develop and install successful gas-fired recirculating controlled combustion annealing ovens. Shown above mounted on a MOCO dual spooler for tandem operation with wire enameling equipment.

This series of annealers is available for horizontal inclined or vertical mounting positions. No external source of inert atmosphere is needed.

1952-FIRST



VERTICAL WIRE ENAMELING OVENS

1952—FIRST to develop and install a vertical two-zone high velocity axial flow recirculating wire enameling oven with internal recuperative catalytic unit which eliminates condensate and recovers latent solvent energy.

Five other models complete the range from the finest wire through large rectangles. Rapid heat impartation and a high degree of temperature uniformity provide greatly increased production and quality.

WIRE EQUIPMENT DIVISION

MICHIGAN OVEN COMPANY

425 Brainard • Detroit 1, Michigan

For the engineering achievements that keep you competitive—look to MOCO

Why? Because There Is No Substitute For Experience

FOR GREATER OUTPUT—MOCO FEATURES MODERN RECIRCULATING OVENS IN WIRE PROCESSING MACHINES

In the early 1930's radiation type and gravity convection type equipments were replaced by high velocity recirculating atmosphere principles.

This was progression. So were other new principles introduced then or soon after. They made these early ideas as obsolete as the hand cranked automobile.

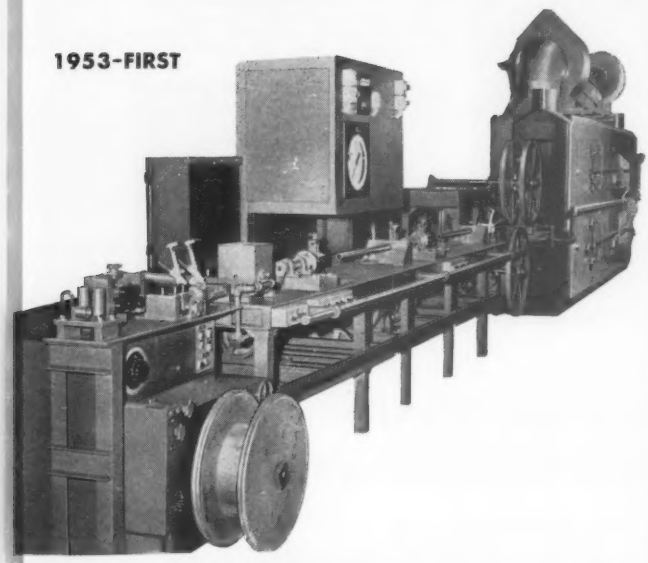
Unfortunately, the builders of wire processing machines did not keep pace with these trends and avoided the expense of remodeling existing machine designs. This forced many wire processing manufacturers to design and build their own equipment—but, of course, without the advantage of continued wide experience in heat processing techniques or of low cost standardization and production procedures.

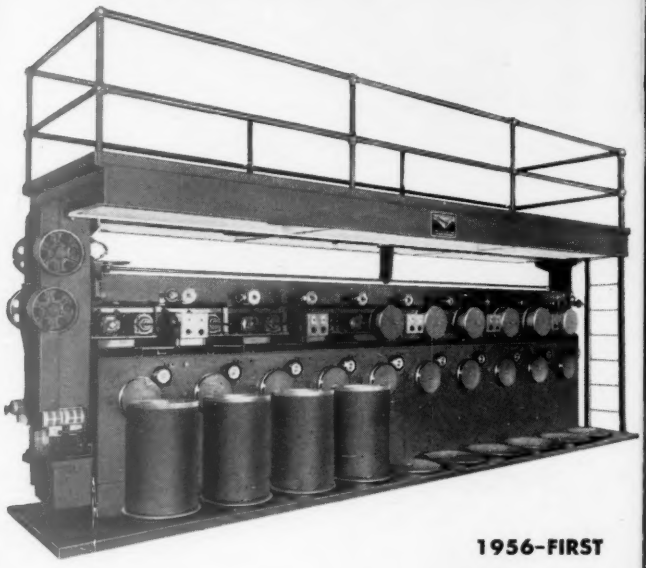
* * *

On these pages are shown some of the "firsts" which carry the MOCO name plate. Acceptance of these engineering concepts in the wire processing industry has been such that other equipment manufacturers have found it necessary to adopt the same principles.

These "firsts" are evidences of progressive thinking balanced with years of experience—*and of engineering achievements* that have brought to the industry greater production output, higher quality products, and reduced production cost.

1953-FIRST





1956-FIRST

RAPID COOL – VARNISH IMPREGNATING OVENS

1953—FIRST to develop and install rapid cool tunnel type varnish impregnating ovens. Shown above is MOCO's double insulating machine and layer wind takeup. This machine applies two servings of glass or yarn and four coats of baked insulating varnish simultaneously (up to 150,000 C.M. area). Permits wire stoppage without damage to wire in the oven—returns to full production in seconds, because of the rapid rise of temperature in the oven.

REEL-R-DRUM PACKERS

1956—FIRST to develop and install a universal wire packaging machine with combination takeup unit permitting packaging of wire on 6″ or 12″ diameter spools or in either 100 lb. capacity pails or 500 lb. capacity barrels. Packaging arrangements are optional from spindle to spindle without machine alteration. The complete line accommodates wire sizes ranging from .0130″ to .064″ in diameter. Speed ranges from 20 to 120 feet per minute.

OTHER ENGINEERING ACHIEVEMENT BY

MOCO

or More Details on ese Proven Features d Many Others Fill

Please send me complete information on the many outstanding MOCO features:

☐ Wire Enameling Machines
☐ Glass Insulating Machines
☐ Other
☐ Self-generating atmosphere Annealers
☐ Reel-R-Drum Packers

NAME_____ TITLE_____

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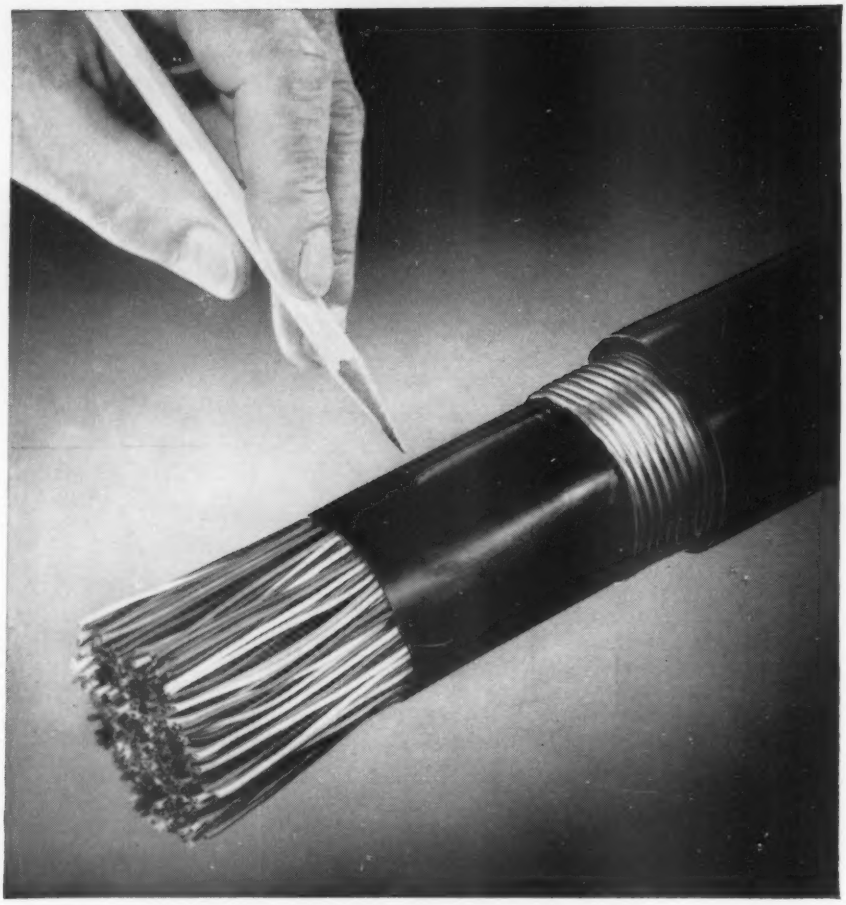
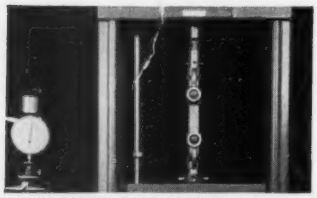
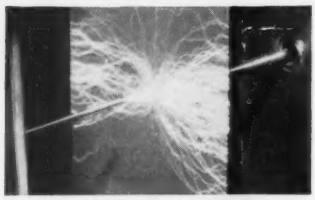
CITY_____ ZONE____ STATE_____



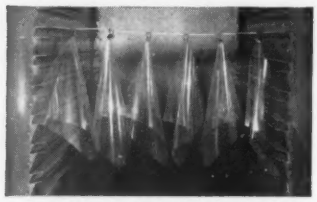
"MYLAR" *offers a unique combination of properties valuable for electrical design*



HIGH TENSILE STRENGTH. "Mylar" is the strongest plastic film. Instron tester shows an average strength of 20,000 lbs. psi.



HIGH DIELECTRIC STRENGTH. Average of 4,000 volts per mil . . . average power factor of 0.003 to 60 cycles . . . dielectric constant above 3.0 at 72°F., 1,000 cycles.



THERMAL STABILITY. "Mylar" has an effective operating range from -80° to 300°F. . . . won't become brittle with age.

Core binder tape made with Du Pont MYLAR® helps Western Electric speed production of communication cable

PROBLEM: Western Electric's new long-life, high-dielectric communications cable posed a challenging problem for production engineers. The problem was this—how to efficiently extrude an outer jacket of polyethylene without fusing the inner pairs of wires also coated with polyethylene.

SOLUTION: After extensive tests with combinations of materials, a tape of Du Pont "Mylar"* polyester film and rubber was selected to act as a heat barrier.

RESULTS: Western Electric reports that abrasion-resistant "Mylar", with its hard, durable surface, helps the core binder tape run smoothly on its equipment without snagging or tearing. Because of its high tensile strength and melting point, "Mylar" helps prevent corrugations of the electrostatic aluminum shield from breaking through the tape and shorting the cable.

HOW CAN "MYLAR" HELP YOU? Whether you make guided missiles or tiny components, you may be able to capitalize on the outstanding combination of properties found in tough, transparent "Mylar" film. For a booklet containing technical data plus information on successful applications, send in the coupon below.

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REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT
MYLAR®
POLYESTER FILM

*"MYLAR" *is Du Pont's registered trademark for its brand of polyester film.*

E. I. du Pont de Nemours & Co. (Inc.)
Film Dept., Room EG-1, Nemours Bldg., Wilmington 98, Del.
Please send the new booklet listing properties, applications and types of "Mylar" polyester film available (MB-11).

Application_____
Name_____ Title_____
Company_____
Address_____
City_____ State_____

YOU DON'T NEED A MASTER MECHANIC TO OPERATE MICRO-WELDERS

That's what

an old Mill Superintendent told us when we asked "What do you like best about Micro-Welders?"

He went on to say that unskilled help at his plant quickly learn how to make good, clean welds on our Micro-Welders.

We don't have to tell YOU how important Micro's Ease-of-Operation is on today's uncertain labor market.

Shop Superintendents also Praise Micro-Welders for Durability, Efficiency, Adaptability and low cost of Maintainance.

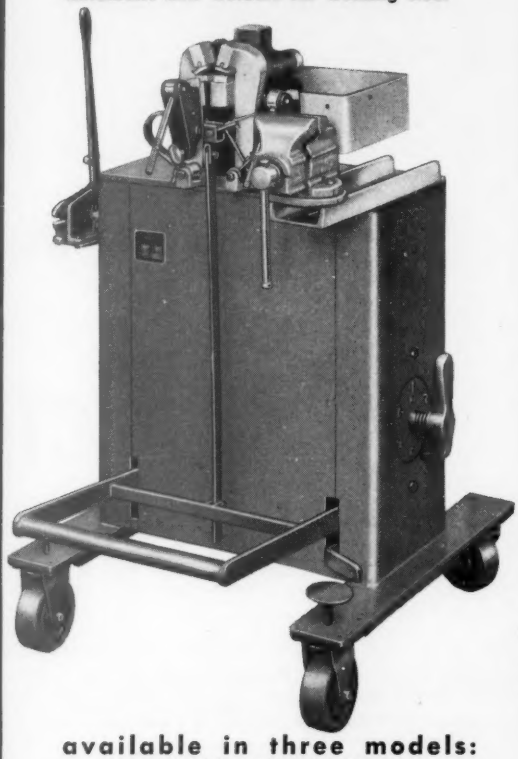
ask the firms that use micro-welders

For instance, our Model "J" Type Automatic Butt Welders are vital cogs in the plants of:

United States Steel • Steel Company of Canada • Simplex Wire and Cable • Nehring Electrical Works • Mid-States Steel and Wire • Laclede Steel • Kennecott Wire and Cable • Kaiser Aluminum • Jones and Laughlin • International Nickel • B. F. Goodrich Company • B. Greening Wire Company • Copperweld Steel • Continental Steel • Broderick and Bascom Rope Company • Bridgeport Brass • Bethlehem Steel • Belden Manufacturing Company • American Chain and Cable.

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

model "J" type
automatic butt welders for welding steel



available in three models:
J-45-S, J-5-S and J-6-S
for welding high and low carbon STEEL wire, sizes from .060" to .375".

The welding cycle on "J" models is automatically completed by one down stroke of the foot pedal. Stock being welded is clamped, contact is made with welding switch and upset pressure on the weld simultaneously achieved.

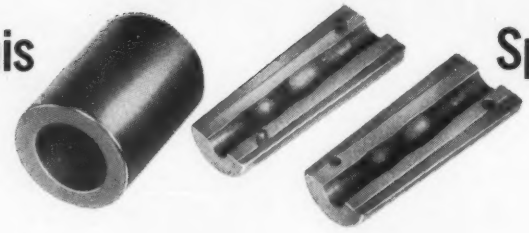
Included: Annealing dies, filing vise, handshears and 4-wheel truck mounting.

MICRO PRODUCTS COMPANY

20 NO. WACKER DRIVE
CHICAGO 6, ILLINOIS
TELEPHONE STate 2-7468

This KENNAMETAL* Solid Die

Replaced this Split Die



in Producing these Grinding Wheels

PRODUCTION UPPED 50% ...DIE COSTS PER PIECE CUT 75%

The small abrasive grinding wheels produced by Mounted Points Company, Inc., of Garden City, Michigan, represented a real production problem.

In the operation, aluminum oxide with a clay binder was compacted into parts ¼ inch in diameter, and from ¼ to 1 inch long. Costly split steel dies wedged into a tapered case, on a manually-operated press, had been used. Parts frequently seized, due to wear on the I.D., and could not be removed without opening the die. Even then, breakage was extensive.

From 40 to 50 parts per hour were produced from each die. Because of the extremely abrasive action of the aluminum oxide grits, die life was only 2,000 to 2,500 at which point the die was worn approximately 1/16 inch larger in diameter.

The L & H Die & Tool Company, of Oak Park, Michigan, fabricated a solid cylindrical die for the operation. It was made of Kennametal Grade K11, was .260 inch I.D. x 3¼ inches long, and was housed in a 2¼-inch alloy case.

With this die, production jumped to 60-70 parts per hour by eliminating the costly operation of assembly and disassembly of the tapered steel die for each piece produced; also by virtual elimination of rejects due to jamming. The die with Kennametal produces 15,000 pieces with only .005-inch wear on the I.D. Parts are easily ejected, breakage of product is held to a minimum, and sizes are held more constant. The original grind, plus four regrinds, produced 90,000 pieces. The die was then reworked to produce a grinding point 1/32 inch larger.

If you have a die application where loads are light, abrasive conditions are severe, and dimensional stability is important, Kennametal Grade K11 may solve your problem. Consult your die supplier, your Kennametal Die Engineer, or write: KENNAMETAL INC., Latrobe, Pennsylvania. C-3088

*Trademark

INDUSTRY AND
KENNAMETAL
...Partners in Progress

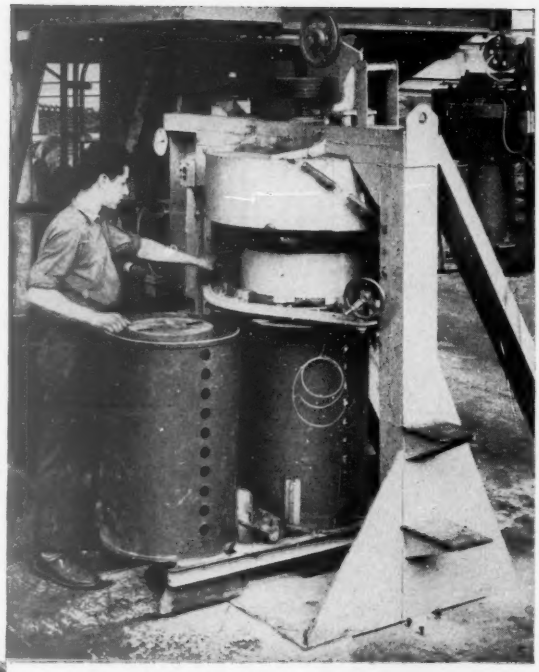
4.800

feet per minute

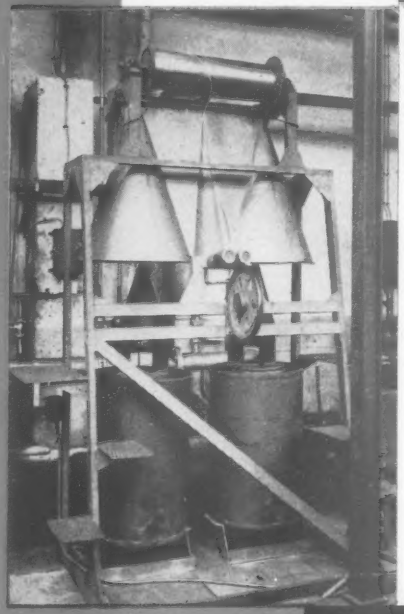
is the speed never reached before of the new continuous

Godderidge

Packaging Unit



Take-up device on a wire-drawing machine.



Double high-speed Pay-Off Stand

OUTSTANDING FEATURES :

- Range of diameter: from 8 to 24 B & S
- Changing of drums at full speed
- Diameter control possible whilst running
- Both-ends of wire accessible, therefore welding and continuous supply of high speed extruders possible by new double

PAY-OFF STAND

For further details write to

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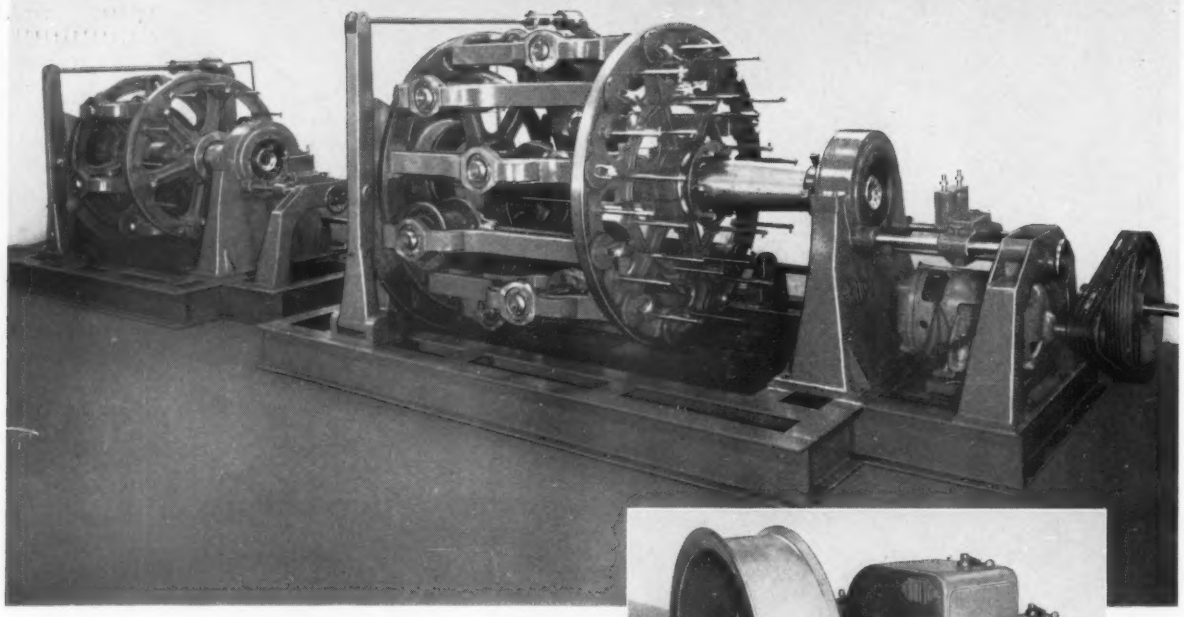
11, avenue Henri Barbusse HOUILLES (Seine-et-Oise)

FRANCE

JEAN MAROQUENE

NEBUTTCO

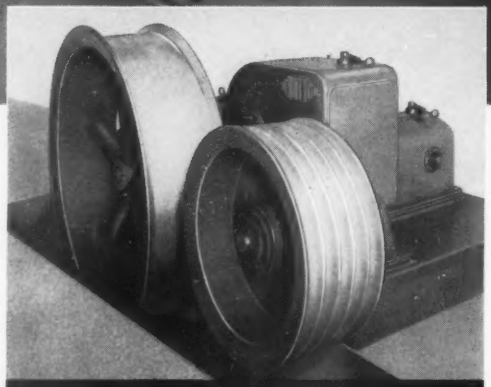
Planetary Stranders



Planetary Strander with 6-12 head planetary sections for 16" dia. reels.

Designed and built with Nebuttco's long experience in manufacturing high quality cable-making machinery, these rugged Planetary Stranders are well known in the industry for their reliability in producing cables at a profit day in and day out.

These high speed machines can be supplied to accommodate a number of different reel sizes — and in various combinations for producing strands from 7 to 331 ends. Capstan units are available up to 96" diameter. We can also supply let-offs and take-ups as well as taping heads both concentric and eccentric. Write us for further information and details.



Capstan 60" dia. with grooved fleeting sheave.

BRAIDERS
CABLERS
TAKE-UPS

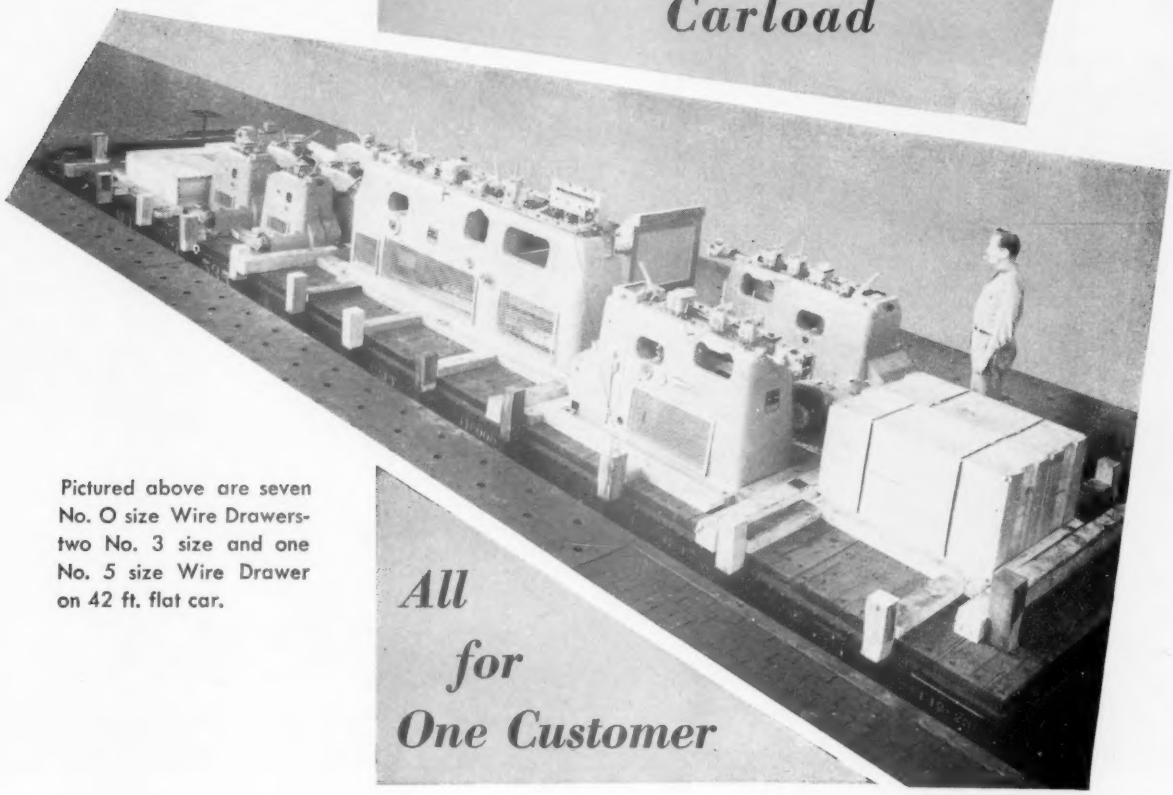
NEBUTTCO

BUNCHERS
STRANDERS
TAPING MACHINES

NEW ENGLAND BUTT COMPANY
Division Wanskuck Company
304 Pearl Street • Providence 7, R. I.
In England — James Day (Machinery) Limited, 28 Maddox Street, London, W1

Ajax-Hogue

Wire Drawers by the Carload



Pictured above are seven No. O size Wire Drawers-two No. 3 size and one No. 5 size Wire Drawer on 42 ft. flat car.

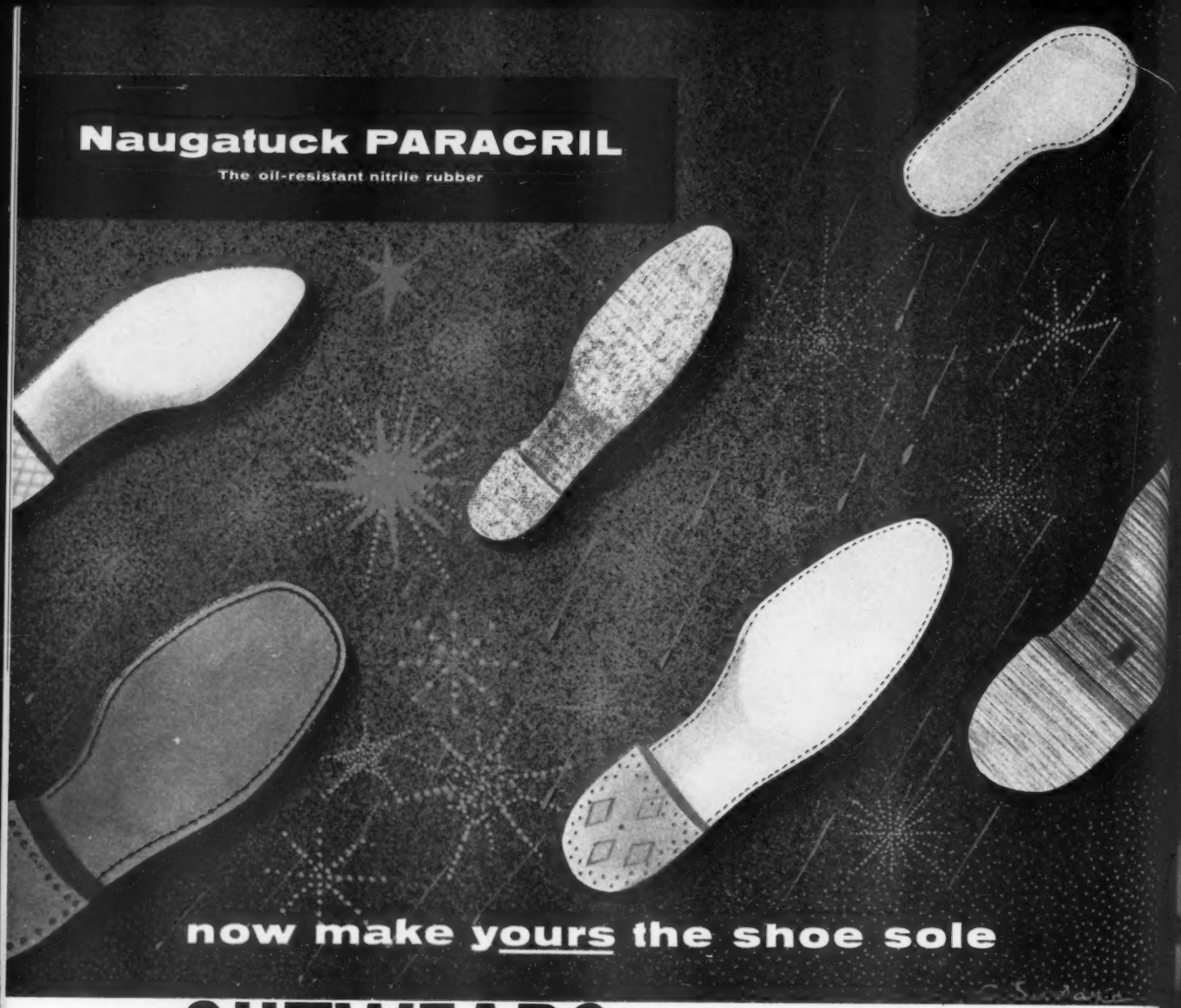
All for One Customer

Write for Bulletin 111-A

One of the larger cold heading plants will attach these **Ajax Hogue Wire Drawers** to ¼", ½" and ¾" bolt makers.

If you have cold headers or bolt makers you, too, can attach **Ajax Hogue Wire Drawers** to your machines and take advantage of **lower material costs - straight & accurate wire blanks - easier heading - Increased header die life and improved products.**

THE **Ajax** MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST., CHICAGO 3, ILLINOIS
W. P. WOOLDRIDGE CO. • BURLINGAME, CAL. • LOS ANGELES 22, CAL.



that OUTWEARS all others!

Thanks to Naugatuck research, it is now possible to compound Paracril® rubber with other inexpensive ingredients to produce a better-than-ever shoe sole material that:

- has twice the abrasion resistance,*
- has 3 times the flex life,*
- has superior ozone resistance,
- has excellent low-temperature flexibility,
- retains colors indefinitely,
- is water-, oil- and fuel-resistant.

One of Naugatuck's synthetic rubber technical representatives will be happy to discuss with any prospective user the formulation details of the Paracril-based compound which makes possible this most desirable combination of properties...not only in shoe soling but also in wire jacketing, hose jackets, weather stripping and many other vulcanized rubber products.

*—of present high-grade, oil-resistant shoe sole materials.

Naugatuck Chemical

Division of United States Rubber Company, Naugatuck, Connecticut

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.

Advantages for You

IT ALL COMES DOWN to one fact...that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered, scaleless tempered, tempered and polished, blued or strawed.

You pay for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

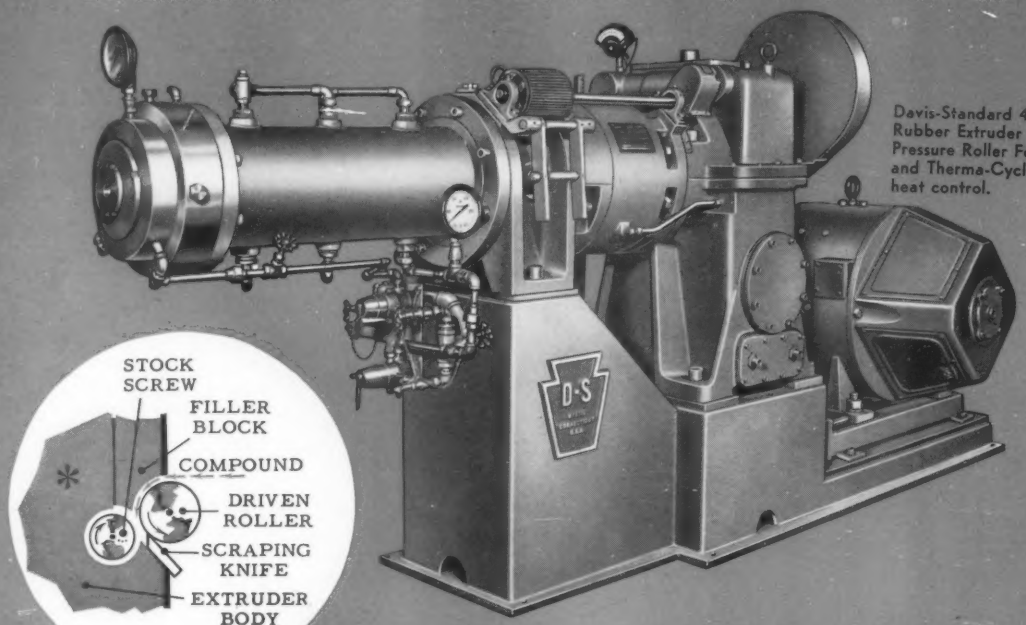
A few of the thousands of high-quality items made from superior Roebling cold rolled steel.

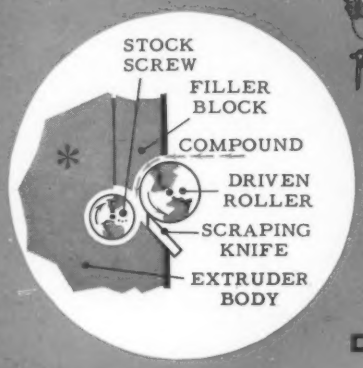
ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

DESIGNED FOR HARD-TO-FEED STOCKS!





D-S PRESSURE ROLLER FEEDER RUBBER EXTRUDERS

FASTER, MORE EFFICIENT EXTRUSION OF TACKY, LOW-TENSILE STOCKS SUCH AS SILICONES AND BUTYLS.

Davis-Standard Rubber Extruders with Pressure Roller Feeders for low-tensile stocks and Automatic Roller Feeders for harder compounds hold consistent delivery tolerances within 1% on stocks which formerly were difficult to feed — even by hand. Ball regurgitation, which often causes starvation of the screw, is prevented.

A self-contained heater-cooler for the cylinder of D-S Rubber Extruders is available to maintain optimum extrusion temperature.

* Both the *Automatic* and *Pressure* Roller Feeders employ a highly-polished chrome-plated roller. A filler block is added to the feed throat, and a scraping knife is positioned against the roller to prevent film build-up.

The Pressure Roller Feeder is driven through a torque-limiting clutch which allows the roller to slow down or stop when the feed section is fully charged with compound.

DAVIS-STANDARD PRESSURE ROLLER FEEDER RUBBER EXTRUDERS ARE AVAILABLE IN ALL BORE SIZES FROM 2" to 6".

The complete line of D-S quality wire machinery includes:

Rubber Extruders	Self-Braking Pay-Offs	Drag Capstans
Splice Boxes	Vulcanizing Tubes	Steam and Water Seals
Continuous Take-Ups	Pulling Capstans	Caterpillar Capstans
Dancer Control Columns		Wire Measuring Machines

For further information write to:

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DIVISION OF FRANKLIN RESEARCH CORPORATION

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flawless faster die finishing with scientific compounds

Modern die manufacture
such as New Jers
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HYPREZ

For economy of production
and for finish to exact specification,
New Jersey Carbide Die Co. uses Hyprez exclusively

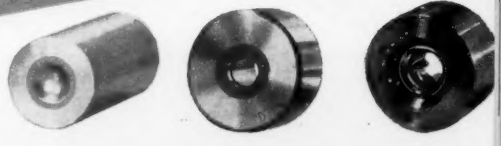
High Precision DIAMOND COMPOUNDS

Serving many of the foremost plants in the wire industry, New Jersey Carbide Die Co., of Jersey City, uses Hyprez exclusively for rough finishing, lapping and polishing tungsten-carbide dies.

The continuing preference for Hyprez is built upon Hyprez superiority—maintained by research and control; by fast free-cutting action of pure diamonds precisely graded and uniformly dispersed in scientifically formulated vehicles. Hyprez provides the exact grade and concentration for every job.

Ask for a free demonstration

or technical bulletin No. W-18



HYPREZ DIVISION

ENGIS EQUIPMENT COMPANY, CHICAGO 5, ILL.

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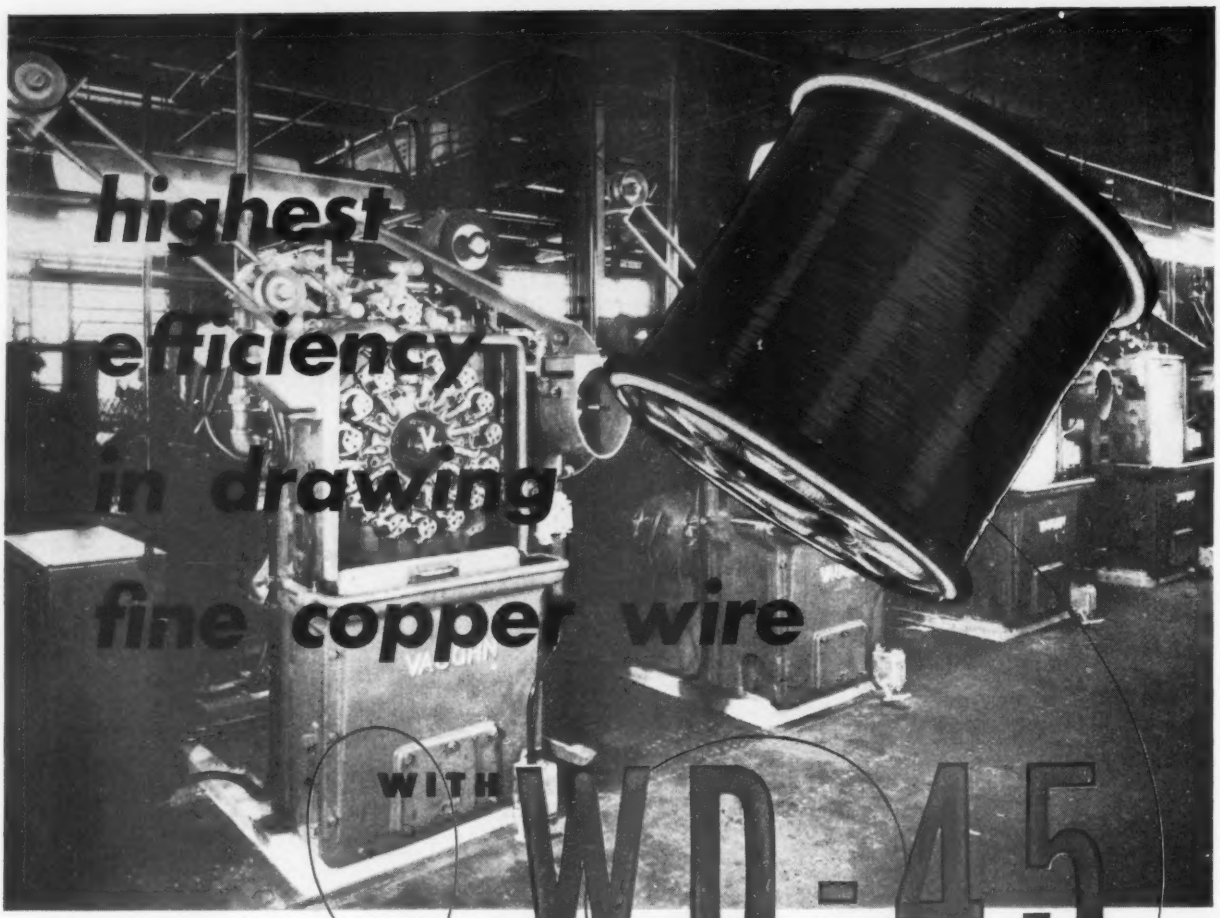

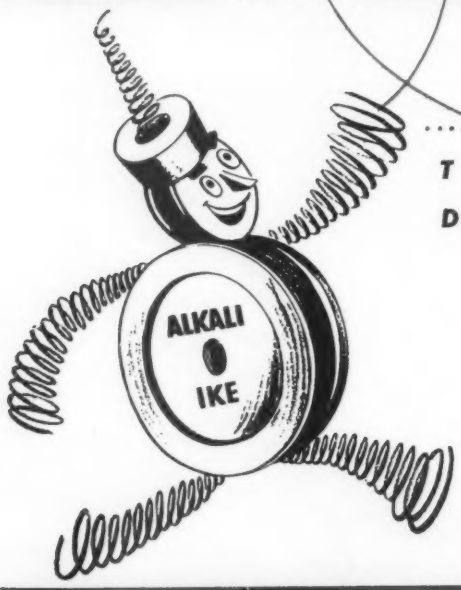

....THE ECONOMICAL ANSWER TO TROUBLE-FREE COPPER WIRE DRAWING OPERATIONS, RESULTING IN:

Increased machine proficiency at high speeds • Cleaner machines • Higher copper soap tolerance • Controlled soap to fat ratio • Cleaner wire for better enamelling • Economical to use – Low concentration • Hard and soft water flexibility.

Ask one of our experienced technical field representatives to discuss the application of WD-45 to your particular operation ... AND WATCH HIM GO TO WORK!

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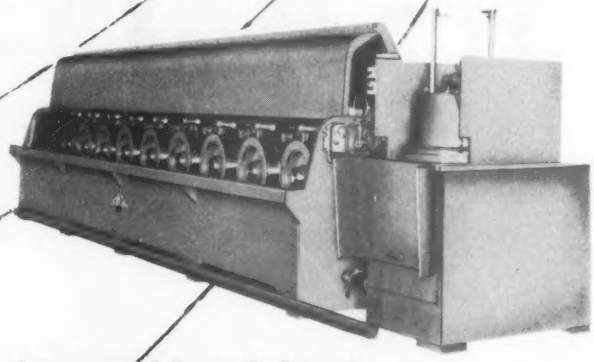
Lubricants & Cleaning Compounds for Wire and All Wire Products

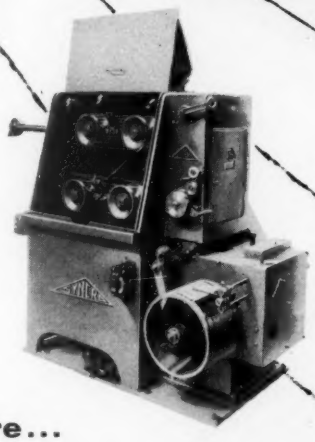
Main and Rector Streets · Philadelphia 27, Pa. · IV 3-3939

Serving both hemispheres for over 30 years...

With a complete line of cold wire drawing machines for all non-ferrous metals



from rod breakdown...



to fine wire...

Nationwide and Worldwide, SYNCRO standards are always highest.

YOU set the quality standard —
YOU set the production goals —
SYNCRO has consistently met, and bettered these quality standards, exceeded production goals.

SYNCRO builds the most know-how into its wire drawing machinery.

SYNCRO®

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Better Machinery for the Wire Industry

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

SWIFT'S FLEXALS

new complex metallic wire drawing compound

FLEXAL MCA:

- For dry drawing
- High titer, metallic stearate base
- Very low moisture
- Homogeneous formulation
- Use directly in die box or cut —where required

FLEXAL "S":

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- Extremely high titer (water soluble stearate base)
- Uniform fine powder
- Contains rust inhibitor and bonding aid
- Very low in moisture

S-39

To Serve Your Industry Better **Swift** 102ND YEAR

SWIFT & COMPANY, Industrial Soap Dept.
4115 Packers Ave., Chicago 9, Illinois

☐ How can we place a trial order for Flexal for evaluation in our operations?

☐ Please send a FREE 10 lb. sample of Flexal for our evaluation.

(Please describe intended usage briefly).....

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Company.....

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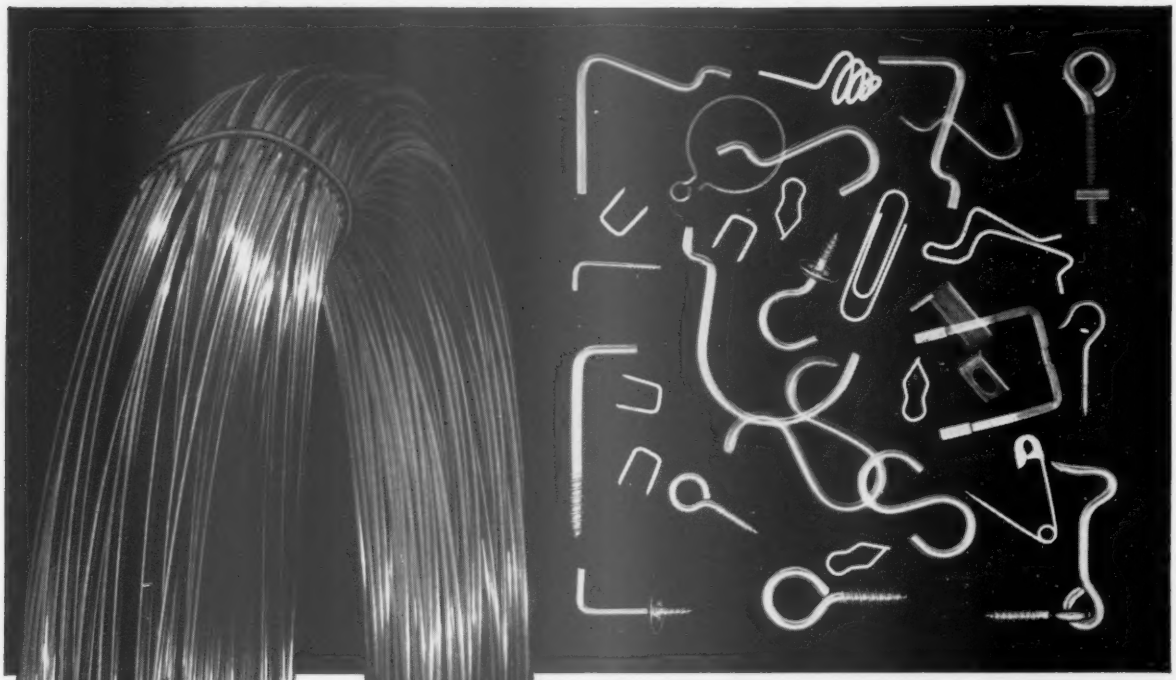
and FREDDIE FLEXAL invites your further inquiry



FABRICATE PARTS

easier, faster, better with

UNITED WIRE

When specs are tough, requirements rigid, savings essential, fabricate your parts with United Wire . . . aluminum, brass and copper alloys including 10-12-18% nickel silver. Here are the big important things you'll find in United Wire:

- Commercially bright — reduces finishing cost after forming.
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- Uniform coils — for trouble free pay-off.
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Your "Wire Forms" can be fabricated easier and better at high speed production with low or no scrap loss by using "United" round or shaped wire.

UNITED WIRE
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PROVIDENCE 7, RHODE ISLAND

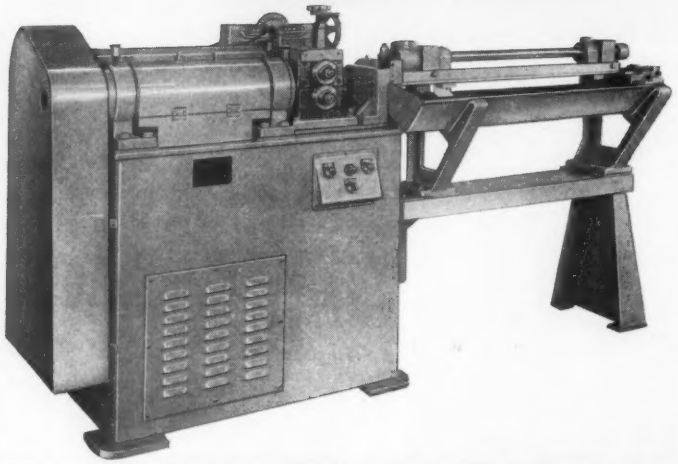
ALUMINUM, BRASS, COPPER WIRE AND TUBE - BRAZING ALLOYS AND FLUXES

new for '58

SHUSTER 2AV

variable speed
electrically controlled

Wire Straightening
and
Cutting Machines



9 WAYS BETTER!

1. Higher speed five die straightening arbor, mounted on ball bearings for minimum vibration.
2. Widest range Reeves Variable Speed —50 to 200 F. P. M.
3. Electric Brake on clutch shaft.
4. Totally enclosed feed roll housing with shafts mounted on Famous Timken Bearings.
5. Machine totally enclosed with guards.
6. Electric control Panel—one position operation.
7. Electric trip mechanism on target.
8. Solenoid-operated roll-type clutch.
9. Wire size range:
   1/16" to 5/16" mild steel wire.
   1/16" to 3/16" high tensile wire.

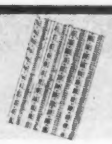
SHUSTER — the oldest name in the field of wire straightening and cutting — introduces for 1958 its Model 2AV variable speed machine, with wire capacity from $\frac{1}{16}$" to $\frac{5}{16}$".

We proudly offer these fine components: Micro-Switch trips new improved target with positive setting and release; National Acme solenoid operates Hilliard roll type clutch; Warner electric brake on clutch shaft; Reeves variable speed unit controls range of feed; alloy steel roll shafts run on Timken bearings.

Send us your wire straightening requirements from .020" to $\frac{11}{16}$" for quotation. Let us prove to you that a SHUSTER pays for itself faster than any other comparable machine!

Representatives in all principal cities.

Send for our free, wall-size, split gauge wire chart from 41 gauge to 7/0.



METTLER MACHINE TOOL, Inc.

155 West Adeline Street, New Haven, Conn.

HUBBARD TRAVERSES

EASILY ASSEMBLED IN 4 RAPID STEPS TO SAVE COST AND TIME

1 PLACE BOLTS IN REEL HEAD

2 SET HEAD ON FLOOR, BOLTS UP

3 TRAVERSE POSITIONED ON WOODEN HEAD

4 TOP HEAD LAID ON TRAVERSE AND BOLTED DOWN

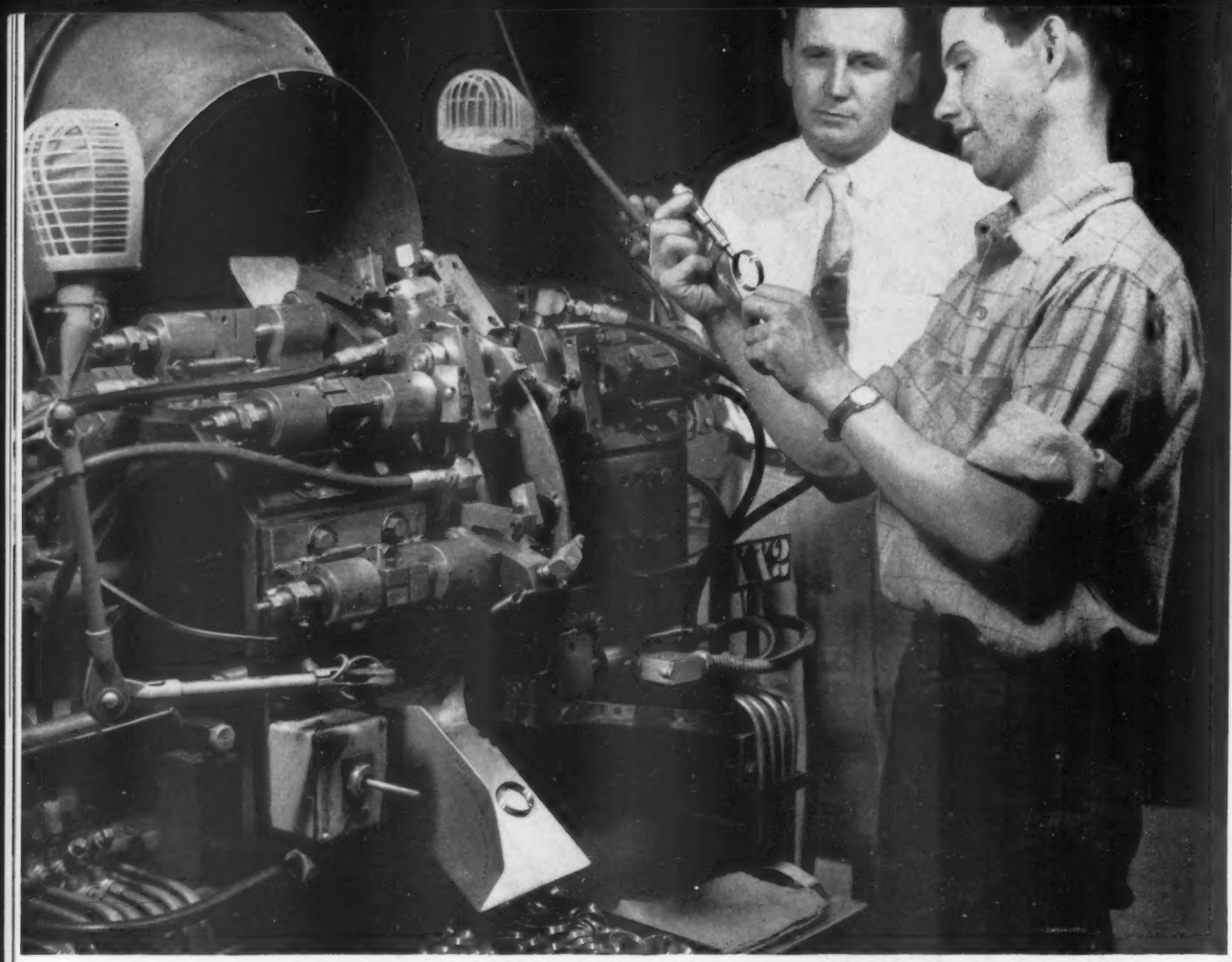
HUBBARD TRAVERSES are made for nailed wood, plywood, metal bound and cast flanges, constructed of one sheet of metal—rolled, welded and flanged—in painted galvanized or plain finishes . . . easy to assemble and to repair . . . reduces damage to cable . . . increases life of reel due to rigid one piece barrel.

Besides TRAVERSES, every type of REEL and SPOOL—returnable and non-returnable in all materials is made by HUBBARD for shipping and shop use.

WRITE FOR PRICES AND COMPLETE INFORMATION.

HUBBARD SPOOL CO.

GARRETT, INDIANA Tel.: GArrett 840



William Kody, American Coil Spring sales manager, watches as important product receives periodic check. An automobile window regulator clutch spring, it must be very precise. Johnson music spring wire fits product and machine.

Johnson Music Wire meets the test at American Coil Spring Company where . . .

Automation Demands Uniform High Quality

When American Coil Spring Company needed a precise music spring wire for an exacting auto window regulator spring, past experience prompted it to turn to Johnson Steel & Wire Company, a leading producer of high-carbon fine-specialty wires.

And when the same company—for 32 years one of the nation's top precision springmakers—was looking for ways to further automate its Muskegon, Mich., plant, Johnson came up with another answer—extra-sized coils of weld-free music wire to reduce machine downtime and wire handling.

One of the largest spring wire users in the United States, American Coil has a company watchword—Springs With a Pedigree. Everyone at American Coil lives up to this slogan by constantly emphasizing quality in every phase of production. This has paid off for American Coil by building a reputation for making the best of standard springs—and special springs others can't make.

Every bit of American Coil's skill comes into play on the auto window regulator spring. The spring has to have perfect diameter because it is mechanically inserted in the window clutch during an automatic assembly. Too large, and the spring won't fit. Too small, and it will cause slippage when the window is raised or lowered. Either variation in dimension will cause rejection.

To make the spring, which has three turns and is close wound with extended legs bent opposite, American Coil invented a special machine to combine the coiling and bending operations.

One-half of the challenge solved by the machine, American Coil then had to find a superior wire. Cast and peak had to be exactly as specified. Uniform dimension of .055″ X-L-O music wire had to be held, both within the coil and from coil to coil. Excellent surface was another must. Johnson's X-L-O music wire met these specifications readily. It is available in a full range of sizes between .003″ and .300″ and can be given a number of phosphate or other surface coatings.

Meeting this customer's requirements through ingenuity and good wire is a formula American Coil applied in the case of the extra-sized coils.

Springs are periodically projected onto the screen of this shadowgraph so that minute details of their conformation are compared with drawings.

Operator prepares for a run of springs for automatic bowling alley pin setters. The Johnson music spring wire that feeds this machine comes in a special 500 lb. bundle so that run will be twice as long. Downtime is reduced.

American Coil is committed to a policy of automating wherever possible. In springs requiring Johnson's .080″ and larger music wire, Johnson doubled coil sizes from the traditional 250 pounds to 500 pounds without welds. This reduced storage space, simplified handling and reduced downtime on the coiling machines. Moves like this permit American Coil to achieve a daily capacity of 18 million pieces with a labor force that numbers usually 350 people.

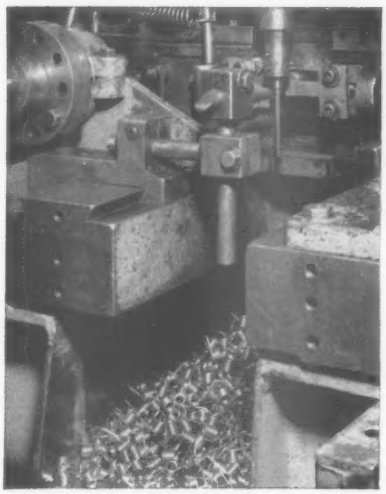
Of the relationship between American Coil and Johnson, Works Engineer James Church of American Coil says:

"The combination of our experience in springmaking and Johnson's superior knowledge of wiremaking, results in a highly successful product."

All these advantages of Johnson's wire are available to you, no matter whether you need music wire or any of the other specialties—

Aircraft Cord Wire . . Armature Binding Wire . . . Belt Hook Wire . . . Bobby Pin Wire . . . Brush Wire . . . Gutterbroom Wire . . . Card Wire . . . Shade Roller Wire . . . Flexible Shaft Wire . . . Heddle Wire . . . Hose Reinforcement Wire . . . Hose Wire . . . Mandolin Wire . . . Piano Wire . . . Rope Wire . . . Safety Pin Wire . . . Special Shaped Wire . . . Staple Wire . . . Metal Stitching Wire . . . Signal Corps Wire . . . MB Spring Wire . . . Tire Bead Wire.

If you have an application which requires high quality and close tolerances, Johnson is ready to serve you. Call your closest district office today.



Nobody watches this machine as it produces thousands of perfectly duplicated springs. If the wire were not highly accurate in dimension and metallurgical characteristics, frequent adjustments would be necessary.

Testing for tension is a constant operation at American Coil Spring. Variations in wire quality would show up here. American is well satisfied with Johnson music wire quality.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
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		Houston	Philadelphia	Warren, Ohio

U.S.I.

Vol. II, No. 6

POLYETHYLENE PROCESSING TIPS

RESIN PROPERTIES THAT AFFECT STRESS-CRACK RESISTANCE OF POLYETHYLENE

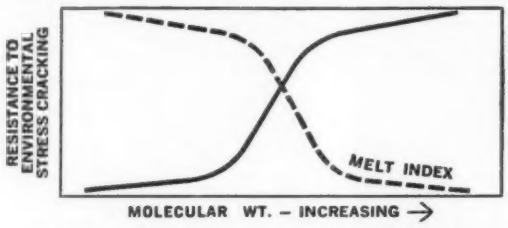
Environmental stress cracking is the term used to describe a certain type of material failure. With polyethylene this failure occurs when the plastic is under high local stress (either external or internal) and in contact with materials such as a soap, detergent, or solvent, which affects the polymer.

Resistance to stress cracking is especially important for applications such as electrical insulation, polyethylene pipe, housewares, and certain types of packages.

Two factors influence the resistance of a polyethylene part to environmental stress cracking: the resin used and the conditions used in fabricating the part.

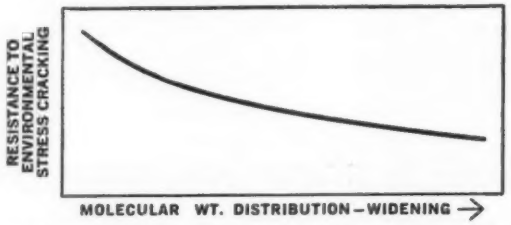
Which resin to use:

Stress crack resistance is greater with a resin of *higher molecular weight* – that is, lower melt index.



Then why not use low melt index resins? Because production rates are lower. The processor must make a compromise between peak production rate and top stress-crack resistance and use a resin that will be satisfactory, if not ideal, in both respects.

Molecular weight distribution of the polyethylene



resin is important too. Resins with a narrow molecular weight distribution (with fewer molecules much higher or lower than the average) have better stress crack resistance than those with wide molecular weight distribution (more of the larger and smaller molecules but the same average). The low molecular weight fraction is more susceptible to attack by environmental materials.

However, the flow properties of a polyethylene resin having a narrow molecular weight distribution and a given melt index are not as good as those of a polyethylene resin having a wide molecular weight distribution and the same melt index. Here again the processor must make a compromise between production rate and the properties he requires in the end product.

Density of the resin will also have an effect on the resistance of that polyethylene resin to environmental stress cracking. The higher the density, the poorer resistance to environmental stress cracking. On the other hand, the more linear or more dense polyethylenes have enhanced flow properties and higher stiffness and tensile strength.

There is no single answer to all problems

It is obvious from the preceding discussion that there is no simple solution to the selection of a resin for a particular end use. The resin must be carefully selected while giving proper consideration to the important end properties required in the fabricated article.

An answer to your particular problem can be found by obtaining a polyethylene resin from a manufacturer who can give you the balance of properties required – high or low melt index, narrow or wide molecular weight distribution, a range of densities. U.S.I. is one such supplier and their Technical Service Representatives stand ready to assist you in the selection of the proper Petrothene resin.

Processing conditions affect stress crack resistance

Processing temperatures, cooling rates, and other processing conditions can have a marked effect on stress crack resistance, because of residual strains left in the fabricated article.

There isn't room to go into these in detail here but the next issue of "Tips" will discuss them more fully.

Meanwhile if you have a specific problem, call on U.S.I.'s Technical Service Engineers. They will be glad to work with you toward finding a solution.

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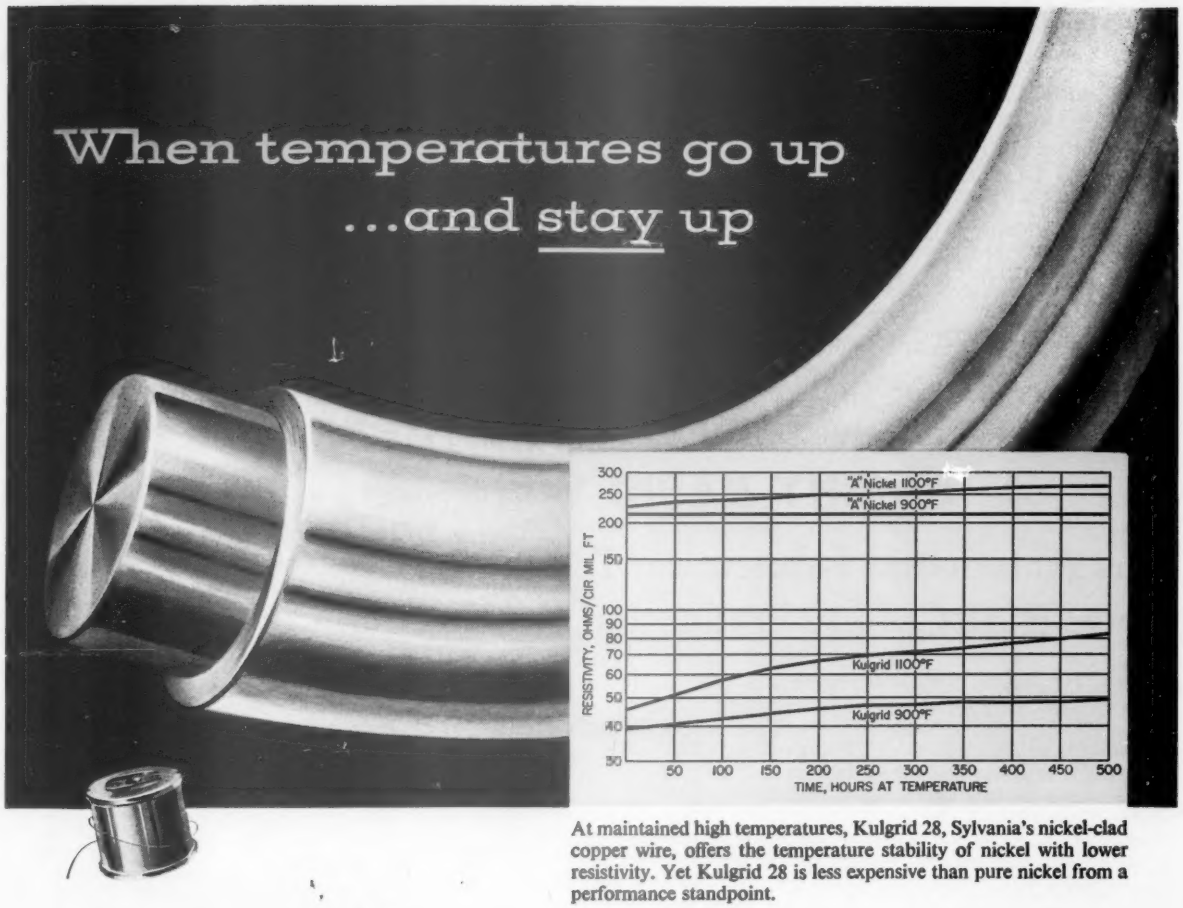

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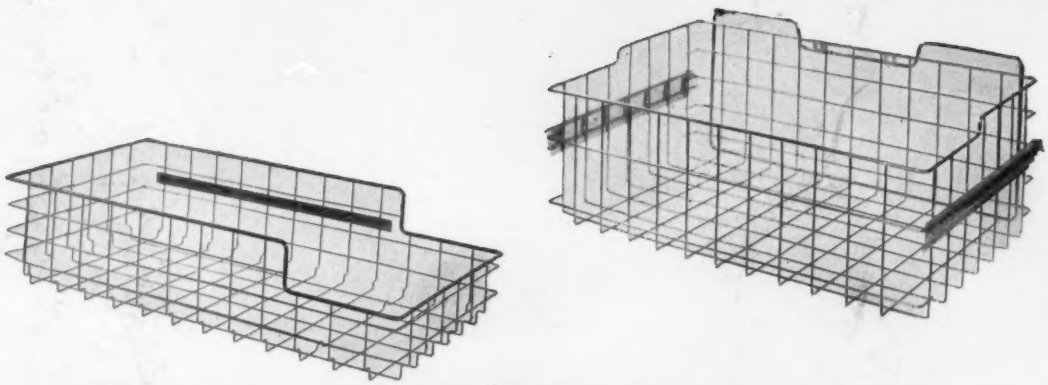

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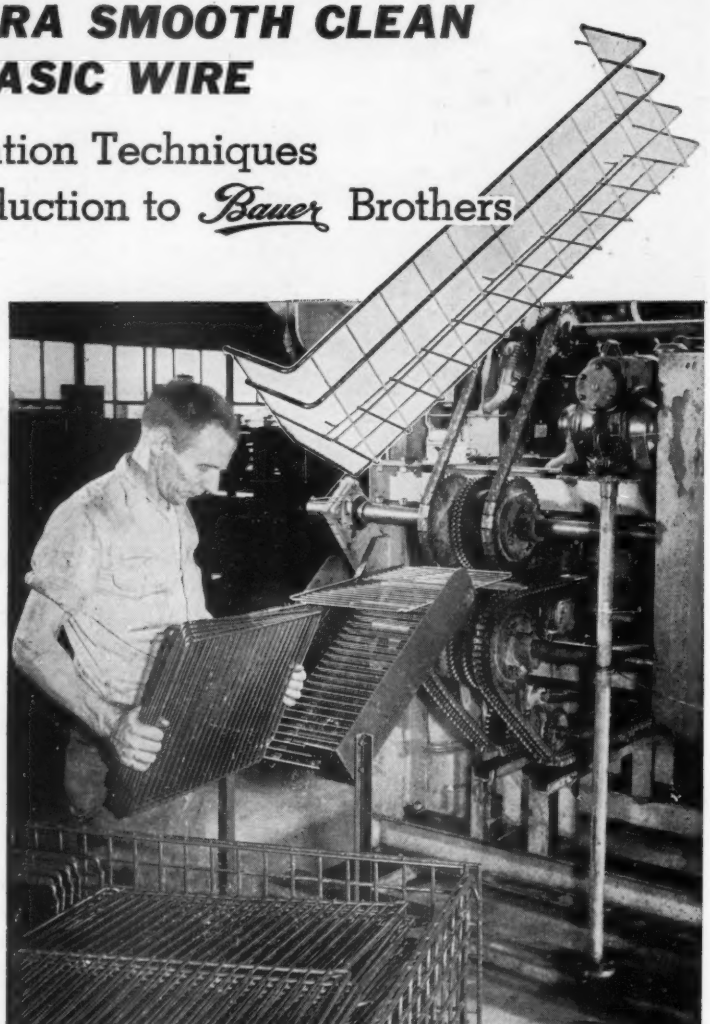

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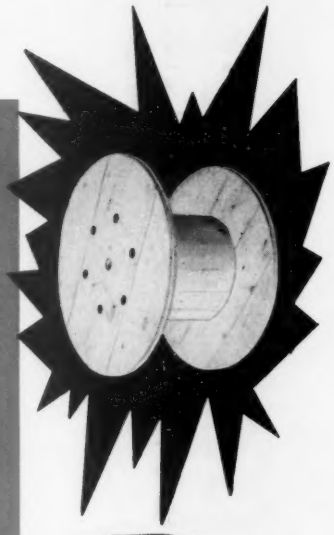

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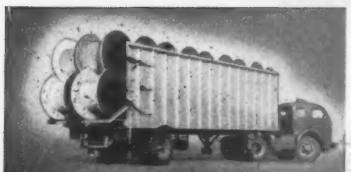

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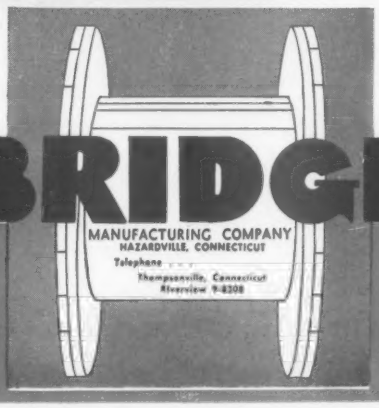

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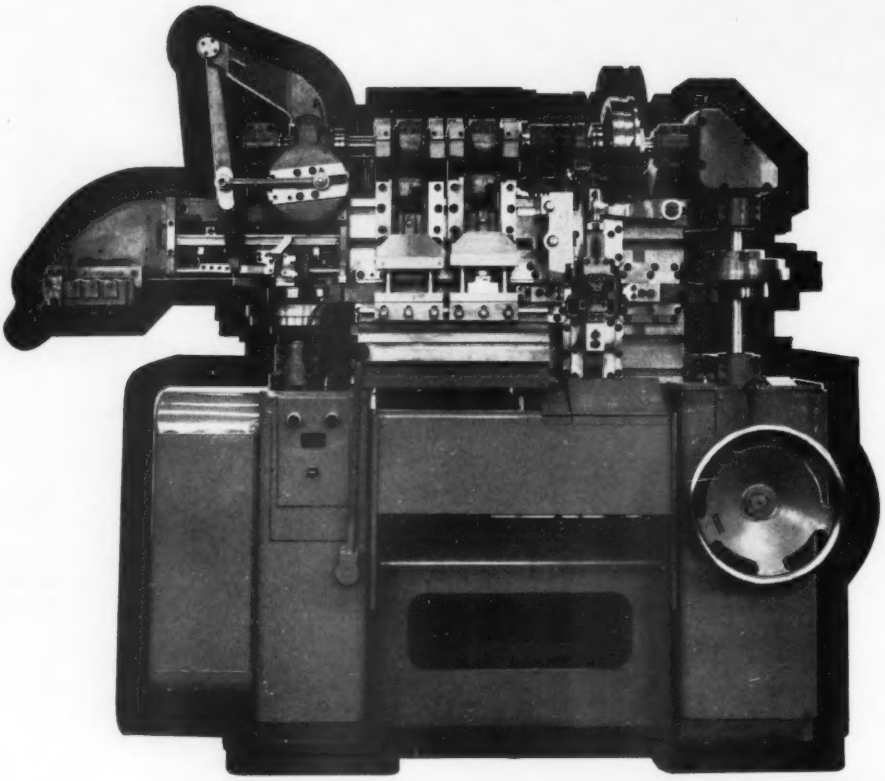

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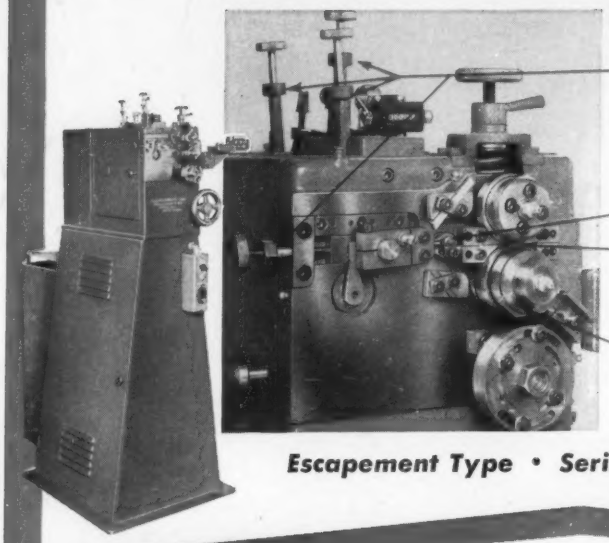

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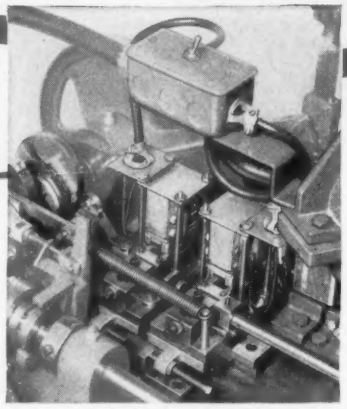

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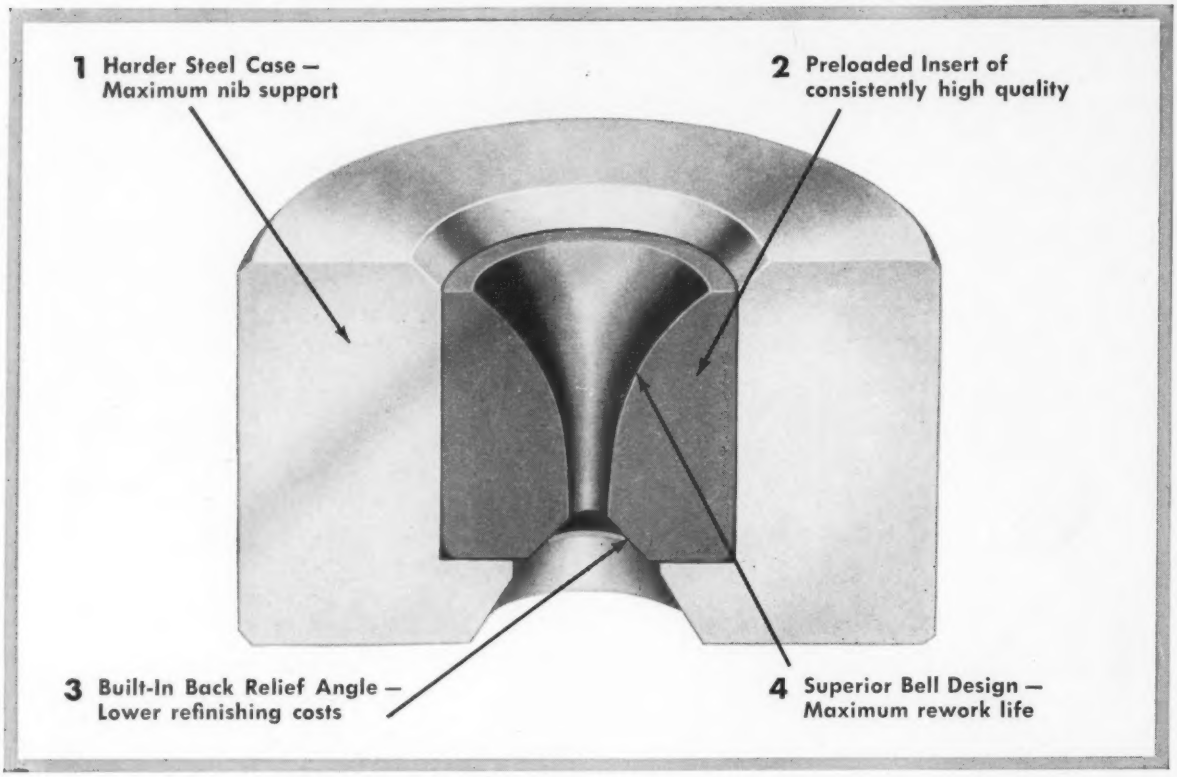
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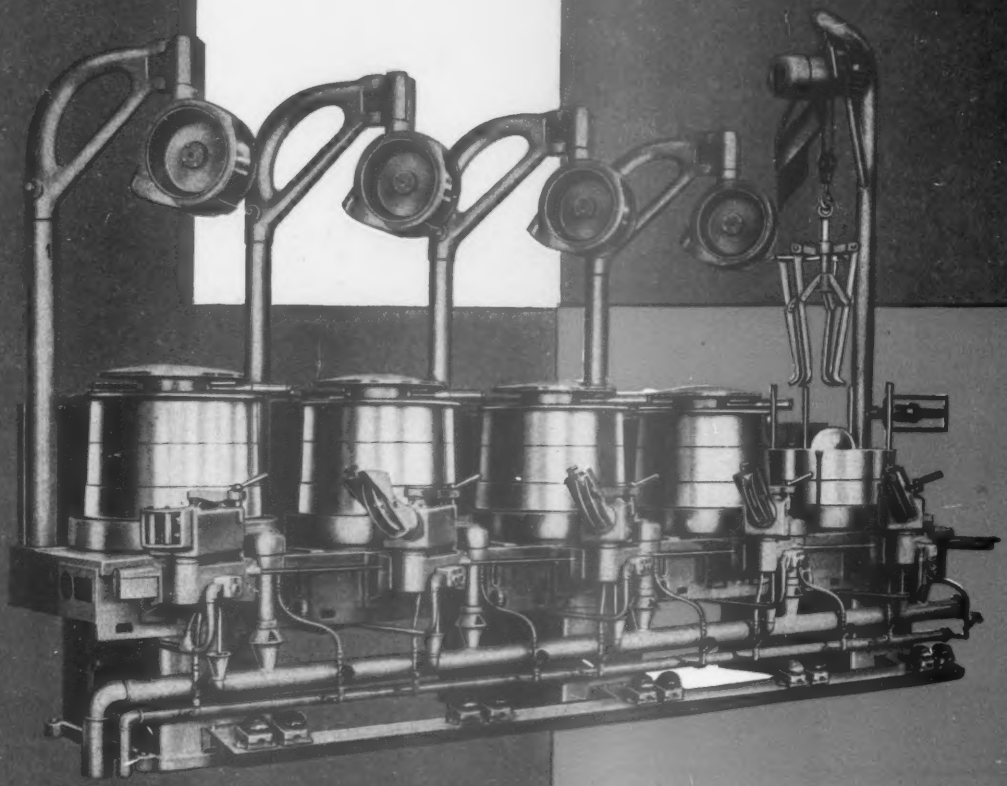

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Exposition of Wire Drawing Machines At The Factory of Maschinenfabrik Herborn

In conjunction with the 5th Annual German Machine Tool Exposition in April 1957, Maschinenfabrik Herborn held an exhibition of their Wire Drawing Machines in their factory at Herborn/Dillkreis. The following is a resume of some of the machines exhibited at that time.

WIRE DRAWING MACHINES FOR STEEL WIRE

One of the main attractions of the exhibition was a side-by-side demonstration of two **Straight-Line Wire Drawing Systems,** one powered by Alternating Current Motors, the other by Direct Current from a Leonard power source.

Alternating Current System

For the Alternating Current system, an eight block unit, Model G Ia was selected (Fig. 1). The G Ia is a truly continuous set up, with no wire accumulation on the blocks, no twist of the wire between blocks, and no slip of the wire on the blocks. This installation is designed for drawing steel wire from an inlet diameter of .395″ down to the range between .250″ to .125″. This unit is a completely new design, and every effort has been expended to construct a machine of more than ample dimensions to handle the inlet diameter of wire, and at the same time present a clean and uncluttered appearance with ease of operation of paramount importance. Only the actual controls protrude from the front of the machine. All wiring and cooling piping have been placed beneath the machine where they are still easily accessible, but, none the less out of the operator's way.

The wire is led in a straight line directly from drawing block to drawing block, through the die-boxes. Large guide pulleys mounted in front of the die-boxes

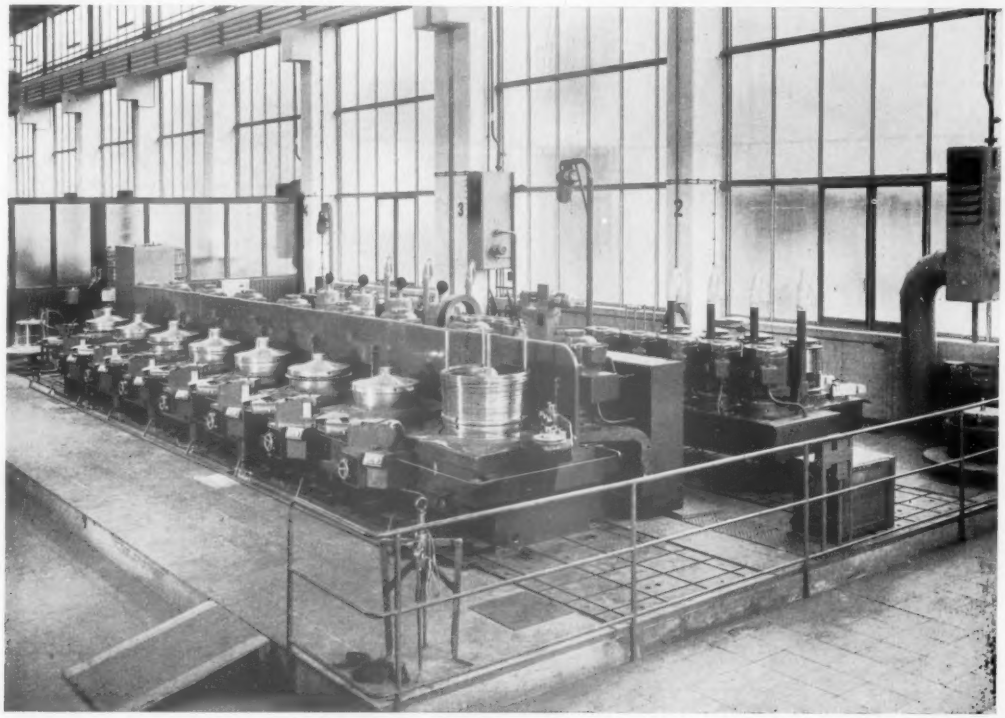

Fig. 1—Straight-Line Drawing Machine Model G Ia With A.C. Drive

The photographs and the text in part are taken from the Nov.-Dec. German language issue of the magazine "DRAHT," Coburg, Germany.

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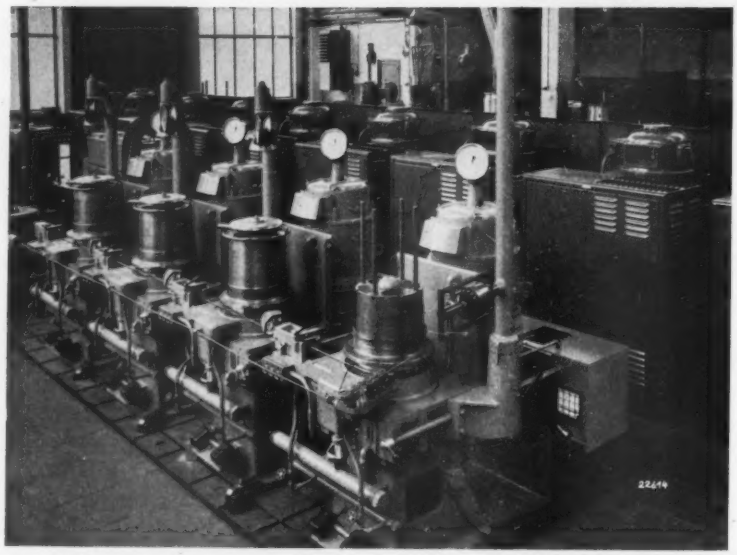

Fig. 2—Multi-Draft Wire Drawing Machine Model GM III With Straight Through Pull and Upper By-Pass With D.C. Current Drive

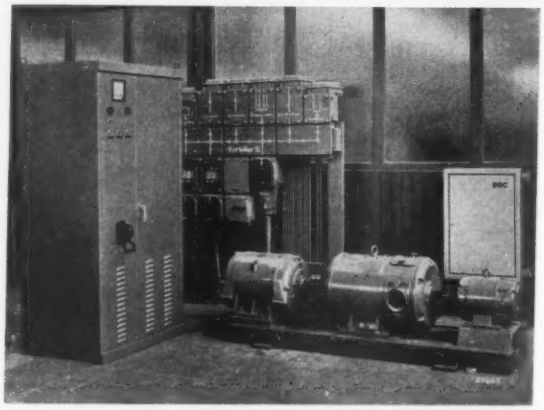

Fig. 3—Leonard Transformer With Control Cabinet For GM III Shown in Fig. 2

keep the wire under complete control. At the finishing stage, the wire is drawn on the pre-drawing rim and then through a two-plane straightener onto the finishing block. An automatically opening inside block stripping spider is used to take off the finished coil. The drawing blocks on this unit have a diameter of 24", and the finishing block a diameter of 27½". Both drawing blocks and drawing dies are efficiently internally water cooled. In addition, the drawing blocks are fitted with the connections for external air cooling.

The G Ia is driven by an AC Slip-Ring type motor with adjustable speeds. A basic gear reduction pattern is built into the machine which provides three additional speeds. The fine adjustment of the drawing speeds is achieved through the regulation of the motor and is adjustable within the range of the motor capacity. With this system, the optimum efficiency of the electrical installation is achieved. The starting and stopping of the blocks, for the purpose of stringing-up the machine, is done by means of a foot pedal under each block and working independently for that block. When the stringing-up has been completed, control of each block is transferred over to a central control panel by means of a push-button switch. At each block there is an interdependent control by which all of the blocks can be speeded up or the machine halted completely. In case of a wire break, the machine will automatically stop itself immediately. A Safety Switch, in the form of a wire rope, has been installed around the entire operating face of the unit in such a way that the slightest pull will halt the entire machine instantaneously.

Experience has proven that heavy diameters of steel wire should be drawn on either single block units or on straight-line units such as the G Ia, since an upper by-pass of the wire for a multi-draft installation is not practical. The HERBORN G Ia Straight-Line installation with AC motor drive combines adaptability, pos-

Fig. 4—Multi-Draft Wire Drawing Machine Model G IIId Double-Decked Blocks (5 blocks = 10 drafts)

(Advertisement)

Fig. 5—Several Wire Drawing Machines, Left to Right: G IId With 2 Blocks; EG 1d; EG 1a and TF 1 * * *

sibility of motor control, and considerably lower cost than a comparable DC type installation.

Direct Current System

For the Direct Current System, a Model GM III was chosen (See Fig. 2). This unit is designed for both straight line drawing, or upper by-pass, accumulation system. The GM III will handle steel wire with a starting diameter of .120" to draw down to the range from .035" to .024". This unit consisted of 4 single block drawing machines coupled for continuous drawing. Each block was equipped with individual motor drive. This installation is extremely universal in nature, designed to handle many different drawing problems. All blocks have a lower drawing ring for a straight line drawing without accumulation, with the upper part of the block a normal 12" diameter block for the accumulation of wire when using the upper by-pass system. Both the drawing blocks and the drawing dies are efficiently water-cooled. At the finishing block, the wire is drawn on the lower drawing ring, led through a straightener and up onto the finishing block.

This GM III drawing machine is powered by means of a Leonard Direct Current Power Source. The large range of control in the DC motors, as well as the 3 additional speeds provided by the gearing makes it possible to draw a wide variety of different analysis steels. A Tachometer mounted on top of each motor permits a direct reading of the prevailing drawing speed. The starting and stopping of the motors for the stringing-up operation is handled by a foot pedal so the operator has both hands free.

The adjustment of the different drawing blocks, for the desired reduction in area is accomplished by the turning of a hand wheel located at the base of each block. It is possible to speed up or slow down, the entire machine, from each block, while the reduction in area remains constant. The machine is equipped with a switch to stop the entire unit in case of a break in the wire, and also a safety switch controlled by the operator in case of emergency.

Straight Through and Upper By-Pass on Same Unit

The GM III unit offers a great range of application. Almost all desired reductions in area, and in addition, different drawing speeds, are available when using the straight through pull. In the case of the upper by-pass, the operation will be performed by accumulation of wire on each block. With this upper by-pass system, it is possible to regulate the speed in such a way that the accumulation on the pre-

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drawing blocks remains constant and the guide-finger on the top of the block remains motionless so that a twist-free drawing of wire is assured. This installation clearly demonstrates the great possibilities of the Direct Current Drive, which, however, requires a rather substantially higher initial capital investment.

Double Decked Blocks for Space Saving

Figure 4 shows the HERBORN Model G IIId Multi-Draft drawing machine with Double-Decked Blocks. Such an installation is notable for the small space it occupies in relationship to the volume of production it provides. This unit is suitable for the drawing of steel wire from an inlet diameter of .138" to draw down to the range from .060" to .020". The lower part of the block has a pre-drawing step of 12¾" diameter, whereas the finishing pass has both a pre-drawing step and a pre-drawing rim so that the wire can be led through the roller straightener and onto the finishing block. The finishing block has a diameter of 16". The finished wire is removed from the block with a stripping spider by means of an electric hoist installed directly on the base of the machine. The 10 drawing die holders are fitted on the front of the machine for easy accessibility. The drawing dies and blocks are efficiently water cooled and special arrangements within the drawing blocks further insure the rapid dissipation of heat.

The drive for this machine is furnished by individual pole changing Alternating Current Motors and a three-speed gear box. In this manner, six different drawing speeds are available. A smooth-starting arrangement built into the machine insures a smooth, jerk-free start. This machine is fitted with foot-pedal switches as well as push button starting and stopping switches and an emergency cut-off switch controlled by the operator for emergency stops.

This type of construction has found many friends throughout the world due to the small space required and the efficiency of operation.

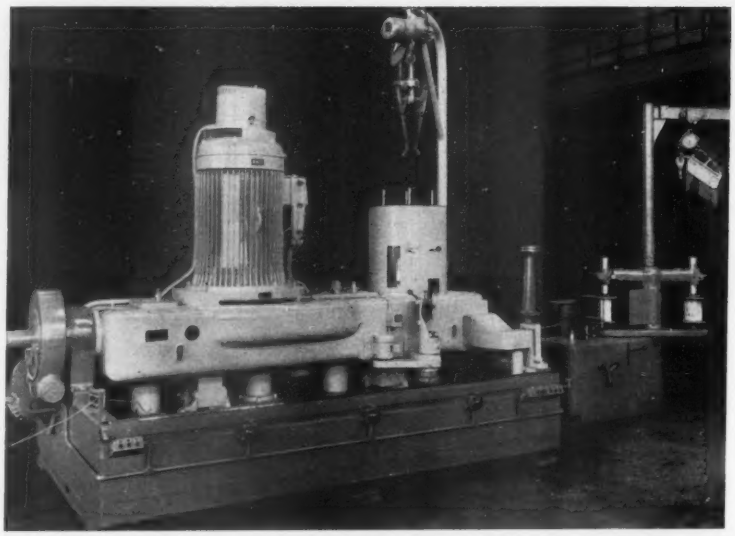

Fig. 6—Multi-Draft Wire Drawing Machine Model TF 1, With 9 Drafts Operating With Submerged System With Dual Spooler Model SA IId

Dry Pre-Drawing Stage for Wet Operation

Figure 5 shows a 4 draft HERBORN Wire Drawing Machine, Model G IId, which is a double-draft unit with two drawing blocks for patented steel wire with an inlet diameter of .165" to finish in the range from .098" to .059". This installation has been devised as a pre-drawing stage for subsequent wet-drawing operations. However, the unit can be used completely independently as a dry drawing installation. Each spindle of this machine draws the wire over a pre-drawing step and then onto a drawing block of 20" diameter. On the block of the final pass, there is a pre-drawing rim in addition to the pre-drawing step, so that the wire can be lead through the roller straightener and onto the take-up block. When used as a pre-drawing stage for a wet-drawing operation, the finishing block can be changed quickly into a pre-drawing block. The dies and blocks are efficiently water cooled. The machine is equipped with a slow starting device, foot-pedal and push button switches, selective switches, and emergency cutoff.

The Model G IId has proven itself in innumerable drawing plants, and the double draft arrangement is preferred by many in view of the ease of operation, low space requirement, and the enhancement of wet-drawing operations. Such an installation of a G IId in conjunction with a wet drawing operation becomes very economical since the same operator can handle both units with ease.

Heavy Single Block Unit

Also illustrated in figure 5 is a single draft, Heavy Drawing Block, Model EG Ia. This is a strongly constructed unit with a pull of about 8000 pounds, suitable for the drawing of steel wire from an inlet diameter of about ½". This machine is driven by an individual motor with bevel-gears running in oil. The drawing block has a diameter of 23½" or 24" and can be operated with six drawing speeds provided by the vertical, flange mounted, pole-changing AC motor and a 3 speed gear box. The dies and block are amply water-cooled. Electrical controls are contained in a separate ventilated cabinet. An electric hoist is built into the base of the machine for the stripping operation. The unit is fitted with foot pedal and push button switches, break switch, and emergency cut off control.

WIRE DRAWING MACHINES FOR COPPER WIRE

For the drawing of copper wire, a HERBORN, Model TF I Wire Drawing Machine was exhibited. This installation, operating under the submerged system has 9 drafts suitable for drawing copper wire from a starting diameter of .250" down to the range of .051" diameter (See Figure 6). The cooling tank of this unit has a large capacity for the drawing liquid, and is fitted with cooling coils which guarantee the proper cooling of the solution. The drawing cones are swung out of the coolant tank by means of an electric motor. This machine is driven by a 170 horse power Alternating Current flange type motor, mounted on top of the 3-speed mechanical gear box. Roller bearings are used throughout the machine, and as is the case with all "HERBORN" Wire Drawing Machines, special hardened and ground steel is used for the gears. The drawing rings are of liberal proportions so that the wear and tear on the wire is reduced to a minimum. The final die is fitted into a **rotating die holder** which improves the diameter tolerances of the finished wire. An electric hoist is mounted onto the base of the machine to be used in conjunction with a self-opening spider for stripping the finished wire from the block.

The TF I is fitted with the special slow starting device. All operations are controlled by push buttons, and all electrical controls are contained in a separate, ventilated, control cabinet. All wiring for "HERBORN" units is completed at the factory so that only the actual connection to the power source is required for the installation.

The TF I Wire Drawing Machine can be coupled to various types of spoolers such as **Double Spooler,** Model SA IId as illustrated in Figure 6. This spooler is designed to hold two spools simultaneously in order to speed-up the exchange of spools. The full spool is rotated 180° and the empty spool automatically moved into place. The spooler is driven through a V-belt

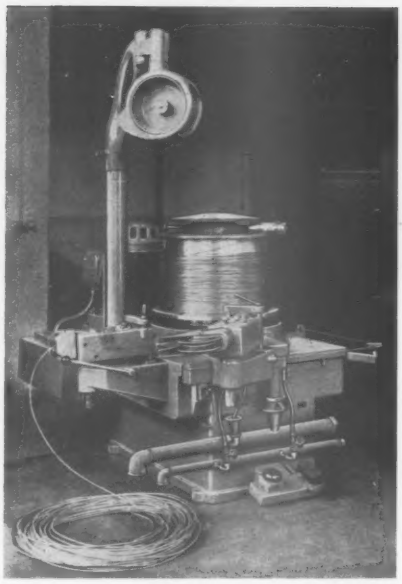

Fig. 7—Single Block Wire Drawing Machine Model EG Id With Double Decked Block *

directly from the finishing block of the drawing machine. The smooth starting of the wire drawing unit is transferred to the spooler directly, as is, of course, the slow stopping. An electric hoist, for the removal of finished spools, is built onto the base of the spooler.

The TF I, as described above, furnishes a sturdy copper wire drawing installation for high productivity in a small space. The positive cooling of both dies and drawing cones permits the attainment of drawing speeds up to 4000 feet per minute. Such installations are operating in many of the large copper wire producing plants throughout the world, and have contributed measurably to the reduction in cost of their products.

Heavy Copper Rod Breakdown Unit

The Model EG Id, illustrated in Figure 7, is equipped with a double-decked block and is designed for the drawing of copper wire from 5/16" diameter down to the inlet size of the Model TF I, or .250". The EG Id has a 24" diameter drawing block. The drawing block pre-drawing rim and dies are efficiently water cooled. The unit is equipped with a pole-changing Alternating Current motor as well as a 3-speed gear box to provide a total of 6 drawing speeds. Machine has slow starting device, foot pedal switch, selective switches, emergency cut-off, and electric hoist for stripping the wire from block. This pre-drawing block is highly recommended because it enlarges the effective range of the TF I unit and can easily be serviced by the same operator.

WIRE DRAWING MACHINES FOR FINE WIRES

Figure 8 illustrates a Fine Wire Drawing Machine, Model F V, designed to draw copper wire from an inlet diameter of .020" down to the range from .004" to .0016". This Fine Wire Machine has 20 drafts supported on two drawing cones while the remaining two cones act as guides. The die holders are **reciprocating** and **adjustable.** The Drawing Solution is contained in the base of the machine and is brought to the dies by means of a circulating pump. The drawing cones remain **Dry** at all times.

On the F V, the finished wire is drawn onto horizontal spools. The regulation of the speed of the spooler is effected through the tension of the wire with a friction disc and conical roll.

The traverse of the wire is controlled through an Aumann Patented Traverse Arrangement which is extremely sensitive. The speed of the traverse is dependent on the rotation of the spool. As the

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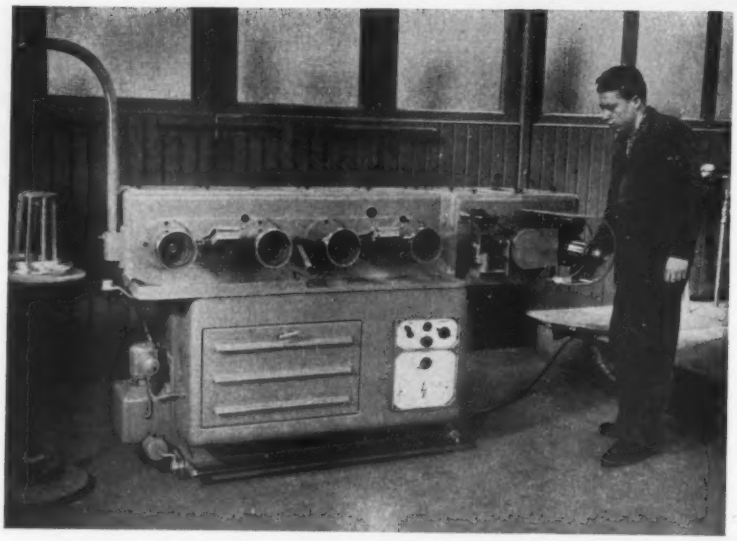

Fig. 8—Fine Wire Drawing Machine Model F V With 20 Drafts * * * * * *

spool builds-up with wire, the revolutions will decrease and the speed of the traverse will remain constant in relationship to the speed of the spool.

The F V is powered by an Alternating Current Motor with a 3 step V belt drive, with slow starting arrangement. In this manner, 3 different speeds, up to 4800 feet per minute can be achieved. HERBORN has developed this machine, and the F VI described below in response to the demand for a high-speed wire drawing machine for fine copper wires drawn under .004″ in diameter over dry cones, with particular emphasis on proper spooling of the drawn wire.

Also exhibited, but not illustrated here, is the Very Fine Wire Drawing Machine, Model F VI. The F VI was designed to draw copper wires in 12 drafts from a starting diameter of .0039″ down to the range from .001″ to .00075″. This unit is powered by a 1 HP Alternating Current, variable speed motor adjustable in the ratio of 1:3. Through the installation of an infinitely variable speed gear, adjusted in the ratio of 1:5, an entire range of adjustment of 1:15 can be achieved.

The wires drawn on this machine must be drawn through Diamond Dies.

VISIT THE HERBORN PLANT

Maschinenfabrik Herborn extends a cordial invitation to all interested parties to visit their factory in Herborn/Dillkreis to see these machines in actual operation and to discuss mutual wire drawing problems. Herborn's United States representative, KURT ORBAN CO., INC., will be happy to arrange the details for your visit, or prepare quotations for these or any machines in the HERBORN line.

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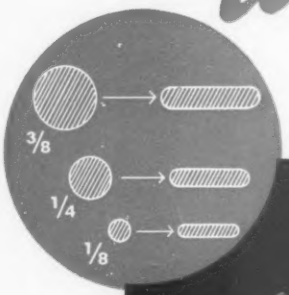

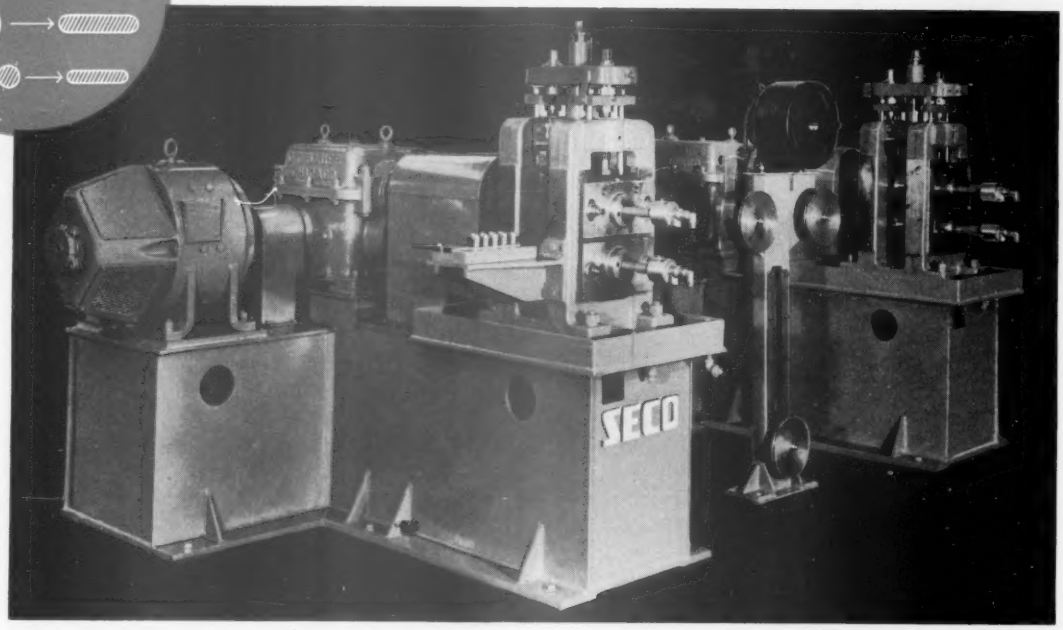

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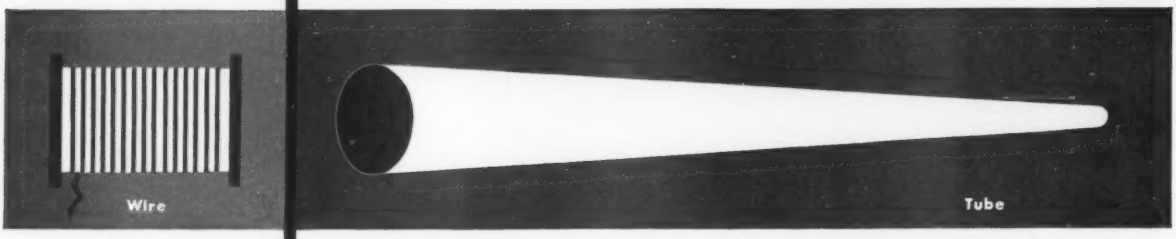

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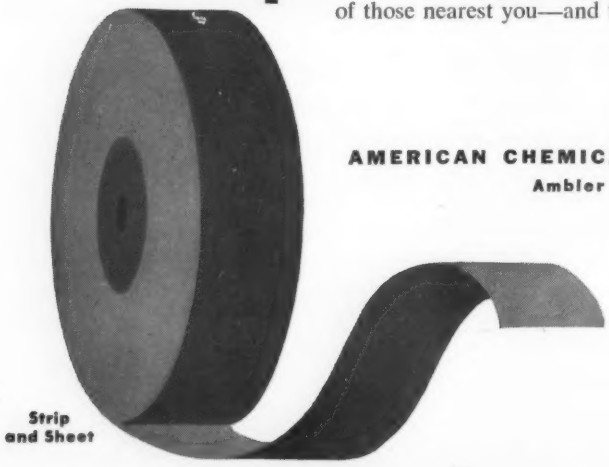

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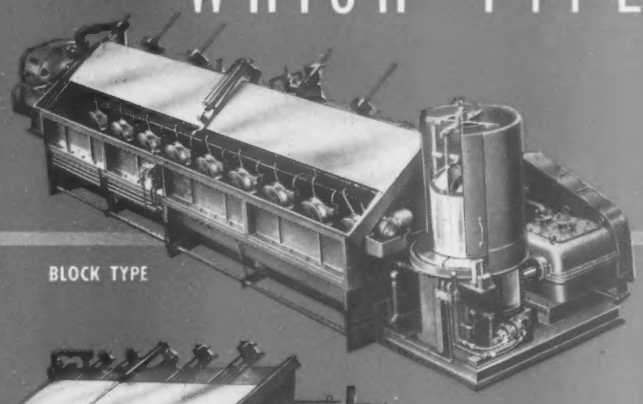
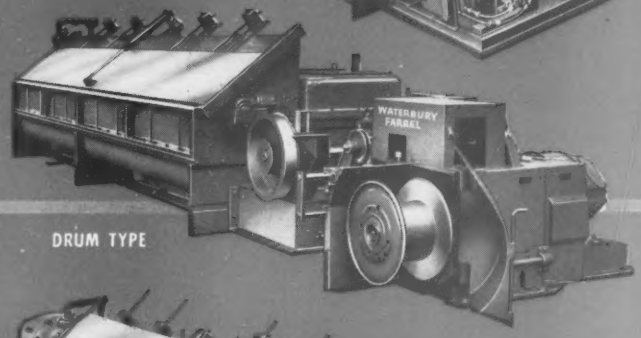


BLOCK TYPE



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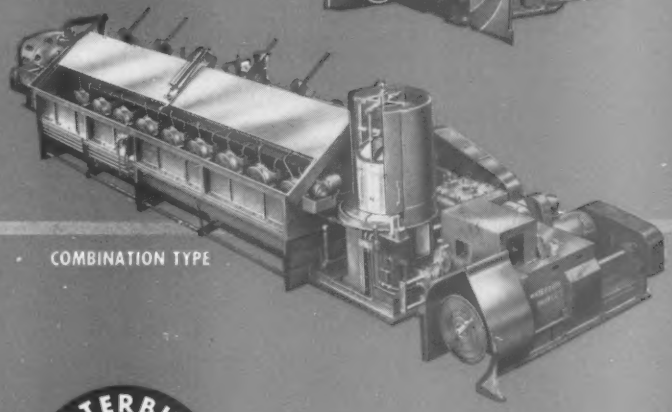

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★ In all three types, Waterbury Farrel *custom-engineers* individual machines to specific requirements for high speed continuous drawing.

★ Each WF machine is backed by over 60 years of experience in designing and building tandem machines.

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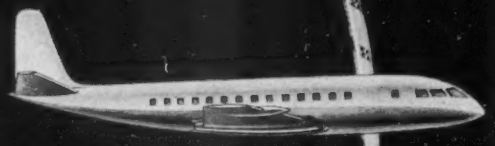

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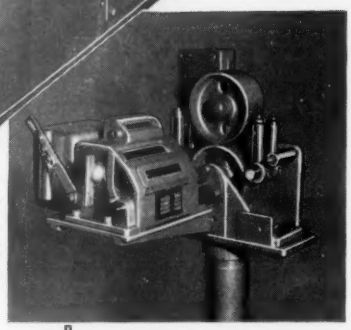

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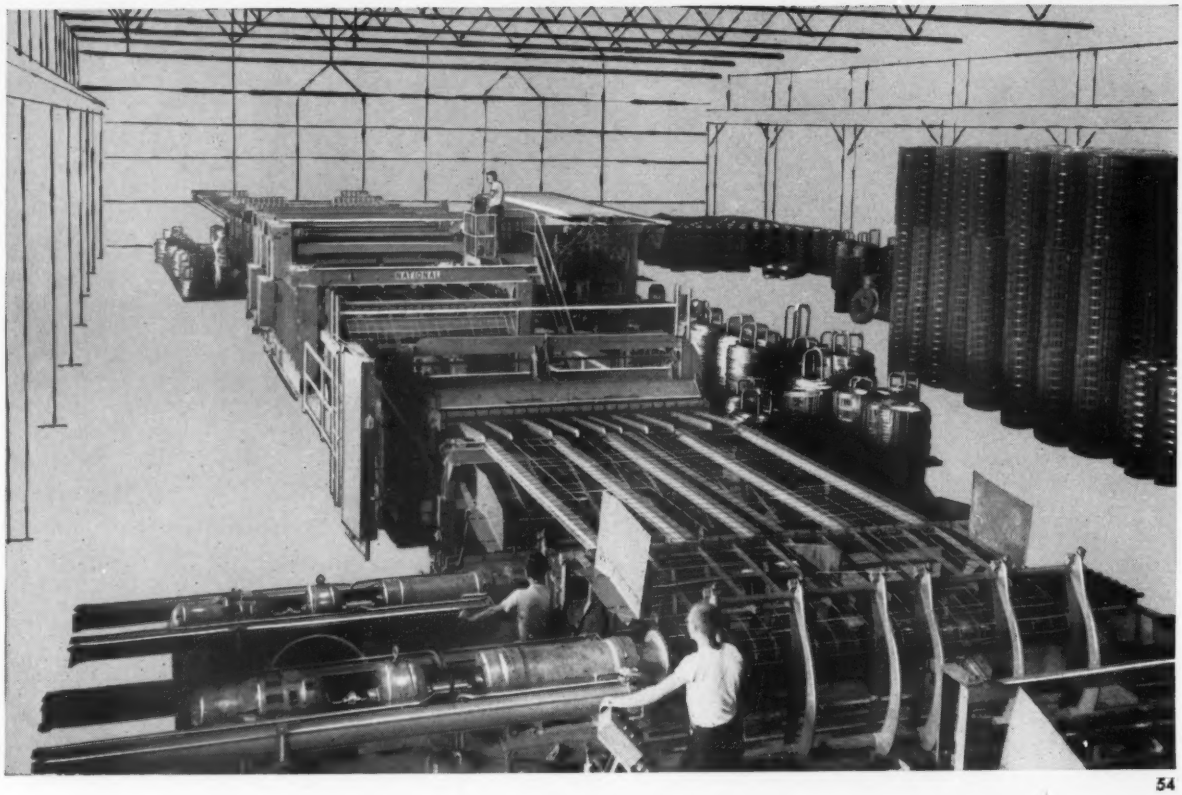

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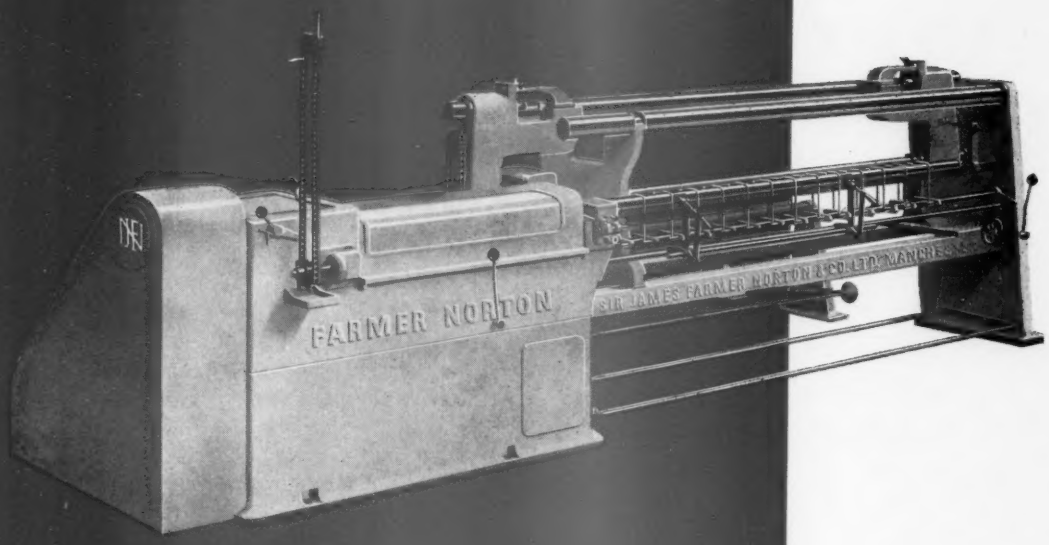

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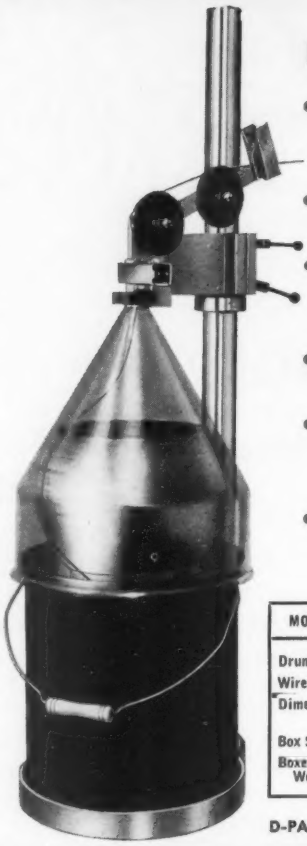
Drum Size	8"	11"-11¼"
Wire Sizes	AWG 27 and finer	AWG 17-30
Dimensions	9" Dia. X 14½" high	11½" Dia. X 16"
Box Size	10" X 10" X 18" high	12" X 14" X 20"
Boxed Weight	5 Lbs.	6 Llbs.

FLOOR TYPE



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MODEL	D-PAK 40-A	D-PAK 100-A
Drum Size	8"	11-11¼"
Wire Size	AWG 27 and finer	AWG 17-30
Dimensions	9" X 12" X 34" high	12½" X 17" X 43" high
Box Size	10" X 13" X 35"	13" X 18" X 44"
Boxed Weight	20 Lbs.	33 Lbs.

D-PAK 100-A, *Illustrated*

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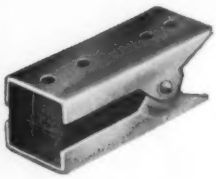

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Dimensions	1" X 3"
Net Weight	¼ Lbs.

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- For Use with Floor Type D-Pak

SIZE	BALL 40	BALL 100
Core Diameter	6"	8"
Net Weight	1½ Lbs.	2 Lbs.

FRICTION CAPSTAN

- Adjustable Tension
- Precise Control

SIZE	CAPSTAN #1	CAPSTAN #2	CAPSTAN #3
Dimension	4⅜"	3-7/16"	2¼"
Wire Size	10-23 AWG	17-30	24-37
Net Weight	3 Lbs.	1 Lb.	½ Lb.

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SIZE	RING 40	RING 100
Core Diameter	6"	8"
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The Wire Outlook

Entry upon a new year is always a time of appraisal or reappraisal of things to come.

We have to face the cold fact that there has been a downturn of greater proportions than expected. Yet, in spite of it, business leaders are overwhelmingly optimistic on both the short and long term prospects.

One broad survey made by Dun and Bradstreet showed nearly 60% of over 1600 business leaders look for better business in 1958, while a little over 30% expect things to run along about the same as last year. The balance were not convinced that business would be good.

At a meeting of the Investment Brokers Association in December, the group was definitely of the opinion that business would improve. An executive spokesman for one of the major steel and wire companies recently told the Purchasing Agents Association that housing and highway projects would contribute much to good levels of activity, although steel operations for the year might not climb out of the 70% of capacity trough. This is due, he said, to the great expansion of the steel industry's productive capacity, with which it will take some time to catch up. Tonnage output should equal that of 1957.

There are many other executives and organizations that feel that the 1958 outlook is going to be satisfactory, even though not all that could be desired. In this the credit men concur. An upturn in the third quarter is generally anticipated, stimulated to some degree by increased government spending.

The first quarter of 1958 should show an annual rate of GNP of 35.5 billions as against 36.9 billions for the same period in 1957. Investment in new plant and equipment will continue to fall off in the first quarter, stock market prices will stay about the same and consumer spending, in spite of many lay-offs, in all probability will continue to hold up fairly well. About a 3 to 5% dip in total business over the last quarter of the old year is probable—serious, but not enough to create a panic.

Employees, faced with the difficulty of moving all the items they can produce, are going to resist requests for wage increases. By the same token, because of lay-offs and the uncertainty and scarcity of jobs, workers are evidencing a lack of enthusiasm for strikes and the resulting higher wages that would make for even fewer jobs. A rising level of unemployment would be almost sure to follow higher prices at this time. Leaders, however, still talk of higher wages and shorter hours—that's their remedy for the downturn.

In the wire end of our economy, mills are operating at a general average of 60% of capacity. High carbon precision spring wire volume is down over 10% over last year and manufacturers' and cold heading wire is in about the same position, although in the Midwest operations of around 80% are reported. In the East, December bookings were the lowest of the year for high carbon, cold heading and spring wire. Merchant wire product sales should begin to pick up toward the end of the winter. To a very considerable extent, the lot of the wire mills will be determined by the reception that the public gives to the gaudy, overpowered 1958 passenger vehicles. So far, the signs have been good, but a too-long sustained period of quiet business will be quite likely to take its toll in total sales.

If we can get through 1958 without going under, the outlook for the following year—and even for the next five years—is more rosy. Starting then, we should experience a period of gradual and sound rebuilding of our fortunes.

Edmund Duval Bickels
EDITOR

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WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 33 JANUARY, 1958 No. 1

About The Wire Association

by Richard E. Brown, Executive Secretary
The Wire Association
Stamford, Connecticut

THE MORDICA MEMORIAL LECTURE FOR 1957

The real background of the organization of **The Wire Association** starts shortly after I became publisher of Wire and Wire Products in 1928. At that time I presented to **Kenneth B. Lewis,** who then represented the **Morgan Construction Company,** the idea of organizing a wire association. The basis of my idea was this:

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While there were associations covering all phases of steel manufacturing, such as the Foundrymen's Association, The American Iron & Steel Institute, The American Society for Metals, and so forth, there was no place where wire men could meet and exchange ideas. In fact, there was little or no information available, either from trade publications or in the various university libraries where such information might normally be sought and there were no lists of mills drawing wire in existence.

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Mr. Lewis called in **George Hartley** and **William B. Pearson,** both of whom thought that the idea was a good one, but that the wire mill operating heads were entirely too secretive to co-operate in any way. However, it was decided to proceed with the organization of a wire association, provided we could find something to use for a common meeting ground.

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In Mr. Lewis' book, "Steel Wire in America," in this connection he states: "The occasion came quite suddenly early in 1930. The Morgan Construction Company proposed to have an exhibit at the meeting of the Association of Iron & Steel Engineers in Buffalo and I arranged to have them show wire drawing equipment."

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This he mentioned to me and I immediately arranged with the Association of Iron & Steel Engineers for exhibit space for a wire section. I was successful in obtaining a number of exhibitors and this gave us an opportunity to invite wire mill operating men to attend such an exhibit and a meeting for the purpose of organizing a wire association.

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Both Mr. Lewis and Mr. Hartley had stated that if from forty to fifty men showed up, they would regard the meeting as successful. When we opened the meeting, we had approximately 200 wire men jammed into a small room and, after discussion, it was decided to organize a wire association for the purpose of getting production men to exchange ideas on how to make and fabricate wire.

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One of the principal objections to forming such an association raised by some of the larger companies was that since they had their own methods of training men, they saw no reason for the formation of any organization which

Mr. Brown has been the publisher of Wire and Wire Products since 1928 and the Executive Secretary of the Association since its organization in 1930. He attended Brooklyn Polytechnic Institute, has served in the New York National Guard, was a Major in the Signal Corps, U.S.A., and is a member of the AISI, the NAM, the American Ordnance Assn., the Reserve Officers Assn., the S.A.R. and a number of other organizations.

Each year the Association's Board of Past Presidents is charged with the duty of selecting a man to deliver the Mordica Memorial Lecture at our Annual Convention to honor and memorialize the Association's first president, John Mordica.

The person to whom the invitation is extended is one considered by the Board to have made an outstanding contribution to the advancement of the wire industry; it is the highest honor within the power of the Board of Directors to bestow upon a member of The Wire Association.

IN MEMORIAM

JOHN MORDICA
1873-1937

would aid the smaller mills in their education of production men. Some companies even went so far as to issue arbitrary instructions to their employees that they were not to exchange information with other companies under penalty of dismissal. One of the larger companies, in order to stop the formation of the association, even offered to subsidize the magazine, provided it would not support the organization activities and would confine itself to publishing only technical research papers.

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Despite such opposition, following the meeting organized by **Wire and Wire Products** at Buffalo, the first meeting of the Organizing Committee was held in February, 1931, at the Hotel Pennsylvania, New York. **John Mordica** was elected President; **Dwight Granger,** Vice President, Ferrous Division; and **Herbert Horsfall,** Vice President, Non-Ferrous Division.

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The next meeting was held in Cleveland in 1931, where the membership confirmed the acts of the Organizing Committee — and we were on our way!

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The Constitution and By-Laws were prepared by **Rene A. Wormser,** Attorney at Law, (who was at that time attorney for the Lead Association) and patterned after the Constitution and By-Laws of that organization. The original By-Laws were submitted to several of the steel companies prior to adoption and the question was raised by one or two regarding the liability of the Association for any obligations incurred by the publication because of the close working arrangements between the publication and the Association. As a result, the By-Laws were revised before adoption so that no company or individual member of the Association would have any liability of any kind.

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To solve the problem of operating under these conditions, the Executive Secretary agreed to become personally liable for all obligations of the Association. This condition still exists. From time to time the By-Laws have been amended to meet changes made necessary in the operation of the Association and today reflects our current needs.

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An important contributing factor to the success of the organization of the Association was the introduction of the tungsten carbide die in 1929 and 1930, compelling a complete revision of existing wire drawing practices, which eventually changed the industry from a craft-controlled trade, to a metallurgical and engineering controlled industry, where the processes are established by management, rather than by a craftsman at the wire drawing machine.

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A fine thing for both the Association and the die industry was the fact that the Association gave the die people an opportunity to present their story in detail to the industry. The die people, in turn, aided the Association in its early struggles by financial contributions, entertained its members lavishly, contributed freely to discussions and helped with deficits resulting from the holding of meetings.

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At the first Convention held in Buffalo in 1930, it was decided to establish a Wire Association Headquarters suite in order to introduce the men in attendance to each other.

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Since this was during prohibition days and it was quite difficult to get liquor, it was thought that the establishment of such a headquarters would attract those present.

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This proved to be true enough, but so many came to the headquarters that the liquor supply ran out the first night.

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At this point, **Van Miller,** now President of the **R. H. Miller Company,** Homer, New York, stepped in with an organization which he called "The Four Horsemen." Through their strenuous efforts sufficient supplies were furnished for the Association Headquarters to make the entire Convention a success.

Technical Service for Members

Almost from the first day The Wire Association was organized questions relating to technical processes, special machinery and equipment, sources of supply, etc. have come to the office in considerable numbers.

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In such correspondence the names of neither the questioner nor the person supplying the answer are disclosed without specific permission.

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At the present time we average about two inquiries a day or about fifty a month and, since each inquiry requires some research work and several letters, the time demands upon our staff are considerable.

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Among the early activities undertaken by the Association was the appointment of a committee for the standardization of reels and spools used in the wire industry. This committee was headed by **E. W. Clark** of the **General Electric Company.** Upon completion of its research, the standardization recommendations were adopted by the industry.

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Another of the early activities of the Association was the compilation of statistics on and lists of the wire mills and their products. By utilizing reports of the United States Departments of Commerce and Labor and the American Iron and Steel Institute and with the co-operation of the carbide die and wire machinery manufacturers, a fairly comprehensive picture of the wire industry was compiled.

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In 1932 **The Wire Association** was requested by the **Signal Corps,** U.S.A., to make a survey of the resources and the ability of the wire industry to meet mobilization requirements in the event of a national emergency or war.

The survey was completed and **The Wire Association** received a letter of commendation from both the Secretary of War and the **Signal Corps.**

Conventions

In 1932 arrangements were made to hold our Convention simultaneously with the National Metal Congress and the American Society for Metals, and the convention accordingly was held at Buffalo, in conjunction with the Metal Show.

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This arrangement lasted until 1943, when difficulties arose in connection with hotel arrangements at Cleveland for the 1944 Convention. We had an arrangement with the American Society for Metals that the Carter Hotel would be reserved for the exclusive use of **The Wire Association,** the arrangement being ratified by both the American Society for Metals and the hotel.

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Shortly before the Convention date, Mr. Eisenman, Secretary of The American Society for Metals, informed us that he was cancelling the arrangements and that we would have to make our hotel reservations through the Housing Bureau, thus compelling our members to be distributed all through the city.

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Since our Convention activities had always been concentrated in one hotel, this was unacceptable.

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A committee, consisting of **D. D. Buchanan, R. N. Hussey** and **R. E. Brown,** was appointed with instructions to meet with the American Society for Metals to iron out the difficulty.

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Mr. Eisenman met with this committee and advised it that there could be no alteration in this decision.

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The committee decided to withdraw from the ASM affiliation and, as a result of this meeting, the Secretary approached the William Penn Hotel in Pittsburgh and through their co-operation, arranged for the holding of our Convention independently of the American Society for Metals on approximately the same dates.

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This severed our connection with the American Society for Metals and the following year, instead of having a show, we turned to the idea of plant inspection trips as a substitute.

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This first independent National Convention held by the Association at Pittsburgh in 1944 effectively dispelled the idea that it was necessary for us to affiliate ourselves with other associations in order to have a satisfactory attendance. At that meeting we had the biggest registration and the best attended sessions the Association had enjoyed up to this time.

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In 1945, because of war conditions, it became necessary to secure a permit for the purpose of holding a convention. To secure such permit it was necessary to show that it was essential to the war effort. The government recognized this condition, issued the permit, and our conventions were continued throughout the duration of the war.

Awards for Papers

In 1933, the annual Medal Award was instituted, the medal being presented by **Wire and Wire Products** to **The Wire Association** and the award being made by a committee of **The Wire Association.**

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The first medal was presented in 1934 to **E. J. P. Fisher,** Physical Metallurgist at **Keystone Steel & Wire Company,** Peoria, Illinois.

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In 1937, **The Wire Association** officially took over the Medal Award as an Association matter and in 1942 the Medal Award was made by vote of the Board of Directors.

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During the war years it was impossible to obtain metal for the medals, and certificates were presented to authors for the years 1942, '43 and '44.

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In 1954, a Medal Award Committee was appointed and **Allan B. Dove,** Chairman of the Committee, instituted the policy of rating selections for Medal Awards and Honorable Mention Certificates under the Oxford Point System, a method of rating the qualities of excellence in papers by which all possibility of personal leanings toward one or another author was eliminated and an evaluation secured that was based on the sheer merits of the papers.

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In 1956, it was proposed that, in view of the development of the Non-Ferrous Division, the directors consider a separate medal award and certificates for both the Ferrous and Non-Ferrous Divisions.

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At the Directors' Meeting held in the Spring of 1957, the suggestion was adopted and two medals were authorized, one for each division.

Mordica Memorial Lecture

This lecture was established in 1939 to commemorate the memory of **John Mordica,** our first President, who passed away in 1937; the first lecturer being **Dr. S. A. Braley,** at that time Chief Metallurgical Field Engineer, **Pittsburgh Steel Company,** Pittsburgh, Penna.

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The Past Presidents of **The Wire Association** constitute a permanent committee to nominate each year a candidate for the honor of delivering this lecture, which is given at the Annual Luncheon during the Convention. The man chosen for this honor is one who has achieved outstanding distinction in our industry and the invitation to deliver the lecture is considered to be the highest honor that can be bestowed by the Board of Directors on any individual member of **The Wire Association.**

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The Wire Association Annual

Luncheon was instituted for the purpose of enabling the members to become better acquainted with one another. In the early days, arrangements were made for speakers of national reputation, and during the war years the luncheon programs were devoted entirely to problems relating to the war effort.

An Interesting Episode

At the 1938 luncheon in Detroit, the principal speaker was the Assistant Secretary of War. **The Wire Association** had been selected as the place for him to deliver the initial speech of the government's campaign to develop industrial mobilization.

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We had arranged for a guard of honor from Fort Erie together with an Army Band to put on a good show for the Secretary. Everything went well until the Army Band entered the lobby of the hotel.

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At this point the Musicians Union's representatives stepped in and advised that the hotel employees would strike if the Army Band insisted on playing in the hotel. As a result, the concert was held in the street in front of the hotel!

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A cocktail party had been arranged for the national press representatives, about 25 of whom were present, in order to get a good press for the Industrial Mobilization Program.

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However, at this time, the Assistant Secretary was engaged in a controversy with the then Secretary of War, and there was considerable political speculation as to what the end result would be.

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One of the reporters at this party asked just how this matter stood. The Assistant Secretary stated that he had been informed by the President that he would become Secretary of War within the next three months.

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That's what hit the front pages!—and not the government's desire to have industrial mobilization planning featured.

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At the 1939 Convention the speaker at the luncheon was Major General **J. O. Mauborgne,** Chief Signal Officer, United States Army.

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In his talk—which had been approved by both the War and State Departments—he outlined industrial mobilization requirements in the event of war, and pointed out certain policies that should be adopted by American industry at that time.

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Arrangements had been made for a nationwide radio broadcast hook-up. Just before General Mauborgne sat down to the microphone, he was handed a copy of his speech with everything of importance deleted by the broadcasting company censor.

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The General was indignant about this, particularly as the speech in its entirety had been fully authorized by the very highest authority. Despite his protests, and my own, the censor insisted that they would not put him on the air unless he submitted to their requirements. He decided to go ahead with as much of the speech as was left.

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The next day I telephoned from Chicago to the head of the broadcasting company in New York, stating what had happened.

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About a week later, I had a telephone call from General Mauborgne, expressing his appreciation to **The Wire Association** for our action in taking this up with them. He had received a full apology and had been advised that the manager of the Chicago station, who had been instructed to meet him—but did not do so—had been relieved, and that the young man who had taken it upon himself to censor a government-authorized speech had been fired.

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Incidentally, he was the Chairman of the Federal Communications Commission at that time, as well as Chief Signal Officer of the Army, and the broadcasting company could have been placed by him in a very hot spot had he so chosen.

The Smoker-Dinner

The first Smoker-Dinner was held in Detroit, with about 40 men present. The affair didn't amount to very much until the chairmanship of the Dinner Committee was taken over by **Mr. A. R. Zapp,** at that time Sales Manager for Firth Sterling's Carbide Die Division. Mr. Zapp immediately instituted a first-class show and handled it for several years until he retired from the industry.

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Succeeding Mr. Zapp was **Mr. Eber J. Hubbard,** President of the **Hubbard Spool Company,** who now handles the show.

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In this connection, it is essential that the chairmanship of this committee be on a more or less permanent basis, as it is necessary to buy a show the same way one buys anything else, and unless one is acquainted with the show business he is more than likely to get stuck—really taken!

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We have had one or two disturbing incidents occur at these dinners.

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At a Smoker-Dinner held in Chicago, the tips for the waiters were included in the cost of the dinner, but the hotel management forgot to tell the union people about this. When they found that there would be no tips placed on the plates, they immediately stopped the service.

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Within a few minutes we had contacted the shop steward of the union in charge of them, explained the situation and the service was allowed to proceed.

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At another meeting we had a visit from a police officer and a representative of the Purity

League, who told us that we could not have our show.

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It seemed that the American Welding Society had a smoker scheduled for the next night and had a sound truck on the street advertising it to the general public.

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Gus Zapp had to explain that our Smoker-Dinner was not of the same type and was strictly limited to members and their guests and, after making certain adjustments, which satisfied the two representatives, we were allowed to proceed.

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At a Smoker-Dinner held in Cleveland, a dispute arose between the local Theatrical Union and the National Theatrical Union. Since the show was brought from Chicago we were forewarned to be on the lookout for trouble.

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I talked the matter over with **Mr. D. D. Buchanan,** who was the Association's President at the time, and he sent three or four members of the **Republic Steel Company's** police force to the dinner.

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It was a fortunate move, as the local labor union managed to get tickets for the Smoker-Dinner for their representatives and they interrupted one of the acts by destroying a long wig of one of the performers and breaking up some of the electrical equipment.

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In just about one minute flat, one of the Republic Steel Company's men had lifted the man who had created the disturbance out of his chair and simply said to him, "Do you want to walk out or be carried out?"

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That ended the argument. They walked out.

The Wire Association Clock

In 1948 the British members of **The Wire Association,** through **John Rigby,** presented an antique English Grandfather's Clock, valued at $2500, to **The Wire Association.** This clock was presented at the Annual Convention in Pittsburgh and was subsequently shipped to Stamford, Connecticut, where it is now on exhibition in the Association's offices. It is insured for its full value.

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Mr. Rigby stated that the presentation of the clock was for the many services that had been rendered the British members by **The Wire Association** staff.

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A resolution expressing our appreciation of the act of the British members was prepared and sent to Mr. Rigby, who was the Chairman of their committee.

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Each year one of our British members, at the time of our Annual Convention, visits the office of the Association and winds the clock, which operates for 400 days after winding.

The Lewis Book "Steel Wire in America"

In 1951, **Kenneth B. Lewis** offered to contribute his services in the writing of a new book to be called "Steel Wire in America," provided it could be sponsored by **The Wire Association.**

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Due to the necessity for financing the book prior to publication, it was determined to invite certain of the larger industrial companies to participate in the underwriting to the extent of $5,000, with contributions of not more than $200 from any one individual company. This was possible under Article 7, Section 3 of the By-Laws. This underwriting was successful and the book was published in the following year.

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Each individual sponsor received 10 copies and the book was put on sale at $15 a copy, with Wire and Wire Products handling its sale for Mr. Lewis. Under the publishing arrangement Mr. Lewis received the income from the sale of the books to pay him for his time and cash outlay connected with the pre-publication work. In this he just about broke even.

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Mr. Lewis passed away in 1952 and, by authorization of the Board of Directors, an engrossed resolution was prepared and sent to Mrs. Lewis.

Papers and Publications

When the Association was first organized, some of the co-operating companies stipulated that there must be no financial obligation assumed by the Association in connection with the publication—that they must be kept entirely separate from each other.

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So, in 1931, the Board of Directors instructed the Secretary to enter into an arrangement with **Wire and Wire Products** for the exclusive publication of all papers contributed by members of the Association and all proceedings and discussions in connection therewith.

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At this meeting it was unanimously voted that all papers so contributed to the Association, or submitted by its members for discussion at any time, or for presentation at any of the meetings of the Association, should be published exclusively in **Wire and Wire Products,** with the understanding that title to such contributed papers was to be originally vested in **The Wire Association,** but transferred to and copyrighted by **Wire and Wire Products** for the protection of the Association and the Publication.

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This is now covered by the By-Laws in Article 6.

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The plan of having a speaker present a digest of his paper and then throw it open for discussion was adopted in 1931 at the suggestion of **Mr. Ralph K. Clifford.** This has stimulated discussion.

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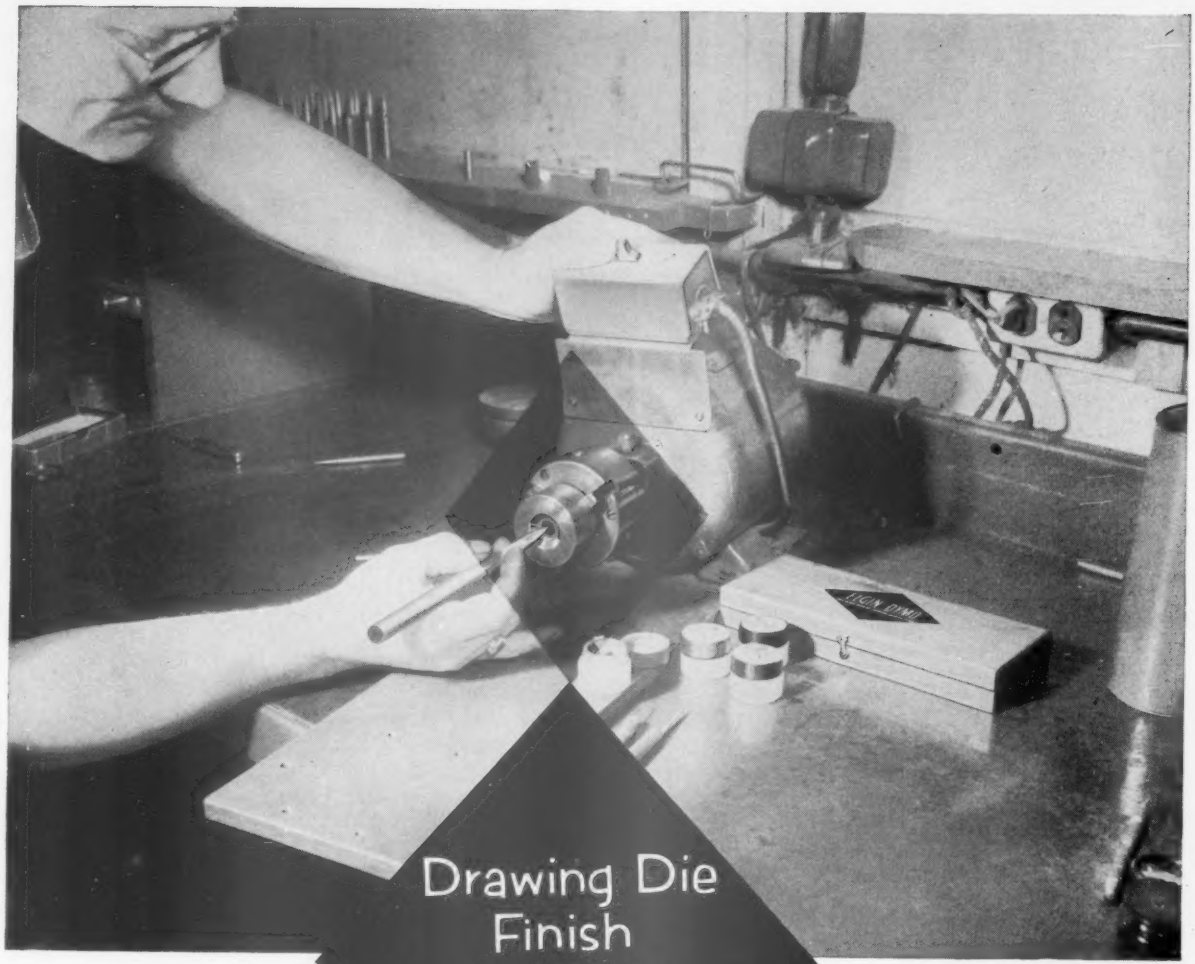
In 1935, **Benjamin L. McCarthy,**

(*Please turn to page* 107)



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Abrasives Division **ELGIN NATIONAL WATCH COMPANY**

ELGIN, ILLINOIS

Proceedings of the Annual Convention of The Wire Association

October 14-17, 1957

Chicago, Illinois

These proceedings are a digest of the discussions recorded following the delivery of the papers at technical sessions. Where there was no discussion, no reference is made to a paper. All papers were published in the October, November and December issues of Wire and Wire Products.

NON-FERROUS DIVISION DISCUSSIONS

Monday Afternoon October 14, 1957

PAPER: "Production Control—Functions and Organization"
by James D. Donovan
Assistant Production Superintendent
Kaiser Aluminum & Chemical Corp.
Newark, Ohio

A question brought out the fact that Kaiser has no expediters, but relies on planners and schedulers, the former being responsible for two schedules—the machine operator being scheduled. In this system 95% of the operations are scheduled, including even minor operations such as saws. Scheduling not only covers weeks, but days and hours. The day shift has the basic scheduling, which expedites the schedules as opposed to material. Scheduling is nominally figured at 80% of capacity to allow for equipment backdowns. A quality control section checks the work, but whether or not the mill can handle an order is determined by the product office. A new product inquiry goes through the sales department, into the product office and then into the industrial engineering department.

PAPER: "Aluminum Fastener Production"
by O. L. Burtenshaw
Senior Metallurgist
Kaiser Aluminum & Chemical Corp.
Newark, Ohio

Information on the use of shaving as a means of producing surface quality on electric wire indicated that Kaiser as well as other companies use die shaving successfully. As to the methods of testing mentioned in the paper, it was asked what the limit of acceptability was for the twist and upset tests. The speaker said that the tests were confined to rivet wire and if seams were detected, the wire was scrapped. The tests are related to end uses—whether for rivets, conductors, flat, etc. wire—standards being set for each type of wire. Specific causes of failure for specific wire must be considered.

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For improved drawing conditions, 3/8" redraw 2024 alloy rod is annealed. This is a tough alloy to draw as it is prone to hardness. The chart in the paper cannot reflect the entire practice. Annealing at least gives a uniform structure with which to start, and without it there is breakage at the capstans. A drawing added to the "F" temper rod might eliminate the higher temperature annealed at the start.

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The hydraulic ductility tester, he said, was a modified small Manco shear, with two dies for upsetting made for this use. Size, shape and grain structure all contribute to formability in heading operations. A questioner stated that, particularly for alloys 5056 and 2024, they had difficulty in making broad heads, which might relate to homogenization temperature, but in any event it had been traced back to the redraw rod over which they had no control because it was purchased. It was brought out that Kaiser draws to two-thirty from three-eights before having to anneal, but much depends on lubrication and other factors. At 200 F.P.M. there is no heat problem and wire might be drawn further, if annealed at the start. Drawing to 14 gage (.056") might require annealing, but it depends on the alloy.

PAPER: "Oxide Coatings on Aluminum Wire"
by A. A. Defoe, Senior Metallurgist
Electrical Conductor Engineering Dept.
Aluminum Laboratories, Ltd.
Kingston, Ont., Canada

As to the use of anodized coats for insulated aluminum wire for power uses, Mr. Defoe said work still had to be done, but the answer may not be far off.

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Asked about cleaning to remove lubricants before oxidizing, he said thorough cleaning was necessary, especially for anodizing. A question about the abrasive effect of this wire on coil winding equipment, brought out that there is no data on this yet, although early anodizing processes produced brittle coatings that were abrasive and tended to splinter on sharp bends. Present efforts are to produce a softer and more ductile coating. Wire produced to date has been just sample material.

Tuesday Afternoon
October 15, 1957

PAPER: "Continuous Vulcanization of Butyl Insulated High Voltage Cable"
by A. L. Rosener, Jr.
Process Development Engineer
John A. Roebling's Sons Corp.
Trenton, New Jersey

Referring to Table II in the paper, which showed an elongation of over 500% and a tensile strength of more than 800 PSI, it was asked why properties like this were sought for insulation. It was pointed out that specifications normally were 600 PSI and some customers sometimes wanted tensiles of 700 to 800. The aim is to produce a good electrical insulation. Elongation is not an important factor.

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It takes about 12 minutes to cure a 500,000 CM insulation all the way through, the length of the steam tube being 40 feet, through which the cable runs at a speed of 2 to 5 F.P.M., with a 3 foot average. With longer tubes of 200 feet, for example, the speed can be greater. The water seals on the vertical CV is a conventional rubber gasket type seal.

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In the extrusion head, it was brought out, the length of the land is about equal to the bore, in this case about 1½ inches. Core tube spacing is usually about wall thickness, plus 10% in back of the beginning of the land, an allowance being made for the swell. Heating dries out the conductor and prevents blister. It has to be hot enough to burn the semi-conductor or tape to provide any real benefit. No mathematical formula has been found for wall thickness for a given compound—best results have been determined from experimentation. No porosity has been found after a full cure.

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On a 3 minute cure cycle, pressure cooling and atmospheric cooling takes ¼ to ⅓rd of the time. This cooling prevents flattening of the insulation on the reel. Pressure cooling is the more important factor.

PAPER: "A Practical Approach to the Extrusion of Thermoplastics"
by Donald C. Craft
Sales Service Laboratory
Polychemicals Department
E. I. du Pont de Nemours & Co.
Wilmington, Delaware

With respect to the use of carbide or steel tips, the speaker said that in the laboratory steel tips were used, but in production carbides were considered to give longer life. This holds true also for the guider tip, but the die receives less wear. The material flowing through it is not abrasive, the guider tip being the critical one.

★ ★ ★

Studies of back pressures in relation to extruder performance have resulted in the development of a metering type screw, the principal difference in which is the channel depth. du Pont prefers a shallower channel depth than some others, since it gives the same production and is less sensitive to pressure fluctuations. Another company has come out with a crosshead in which is a valve that can be adjusted for the cross-head pressures of different screws in differing operations. While a good idea, the same thing is accomplished with a properly designed screw and adjusting the guider tip relative to the die to change what is called "gum space."

★ ★ ★

A questioner said that with Nylon they had the problem of splits forming on one side. The speaker thought that for this it would be well to look at the stock temperature. In Zitel-33 they recommend 500°F. Off-center dies might cause splitting. The vacuum level and moisture may be factors.

★ ★ ★

The speaker said they used a 4 to 1 compression rating because the bulk density of the cubes in the back of the machine is roughly twice that bulk density of the melt, so that at least 2 to 1 is needed, to assure the metering zone not being starved. With 4 to 1 the material is usually melted before entering the metering zone. Vacuum type screws have been used with acrylic type resins, but not with polyethylene. With black Athalon 4 having an .11% moisture content, with a stock temperature of 425°F no moisture was detected in the finished cable produced with a metering type screw on a 3-¼ inch machine. It has not been tried on 6, 8 and 10 inch machines.

★ ★ ★

More accurate control can be maintained if the finished diameter is equal to the die diameter, although some draw down slightly and expand the polyethylene as it comes out of the die. This procedure is one of which the speaker did not approve, as it builds a higher pressure.

PAPER: "A Method of Controlling the Contour of Tungsten Carbide Dies Used in Drawing Copper Wire."
by W. R. Moyers
Chief, Wire Engineering Dept.
and G. M. McLeod
Production Eng., Wire Drawing & Enameling Dies
Western Electric Company
Buffalo, New York

As to what other physical limitations could be used on fine sizes and methods, Mr. Moyers said their tools were used down to .040 inches, 18 gage, B & S. Square corners are not difficult to maintain. The company previously used carbide dies for .040 copper wire, but now is using diamonds, with .064 the smallest for carbide dies. With these they get about 20,000 pounds of 14 gage wire on the finishing die before repolishing. The back dies in the string-up may produce more. Polishing is done 3 or 4 times, before recutting is necessary. The breakdown machines run from 5/16" or ¼" down to .064. Ripper die tolerances are about .005" on the angle of the die. Bearings are roughed out in the ripper. About .001" is taken out in the polishing. The bearing length is put in from the front; this takes a little off of the bearing length. which does not increase the die pull.

Tuesday Afternoon
October 15, 1957

PAPER: "Weighing Samples of Wire to Determine Accurately the Hole Size of Fine Gage Diamond Dies."
by G. M. McLeod, Production Eng.
Wire Drawing & Enameling Dies
and W. R. Moyers

Chief, Wire Engineering Dept.
Western Electric Company
Buffalo, New York

Measuring fine wire for out of roundness with a barrel micrometer with a dial indicator is not good, because such a micrometer is limited by the accuracy of the screw, so an electronic device would be better, but the speaker had found nothing that is simple and accurate. The balance used is a standard product, costing about $275.00. The whole system could set up for about $500.00.

★ ★ ★

Attention was called to a meeting of ASTM B1 in Washington to discuss wire diameters below .003. ASTM B3 provides tolerances for .0001, with nothing below that. The method described in the paper supplies a means that might be considered for ASTM specifications, it was suggested.

PAPER: "Buried Distribution of Telephone Circuits"
by C. C. Lawson
Plant Facilities Engineer
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey

While paper tape was previously used under the aluminum, it was hygroscopic and moisture getting into the tape gave a low dielectric between the conductor and the sheath. Mylar and rubber are non-hygroscopic and are used in combination. Mylar is very tough, but rubber is relied upon chiefly. There would be little difference in the service life of paper and mylar and rubber if the paper remained dry.

Wednesday Morning
October 16, 1957

PAPER: "The All-Metal Reel—for Modern Cable Packaging"
by George L. McCandless
Vice President
The George Evans Corporation
Chicago, Illinois

Asked to compare aluminum reels with steel, Mr. McCandless said some had been made experimentally, but whether they will stand up in service and what the cost of maintenance and repair would be is yet to be determined. It will take perhaps 5 years to supply an answer. Even steel took 5 or 6 years, before recommending them was felt to be justified. The company hopes aluminum will be good for reels, but will have to await the outcome of long field tests before definite answers can be found.

PAPER: "Weaving of Aluminum Insect Screening"
by Robert E. Hirt
Superintendent, Wire Mill
Hanover Wire Cloth Division
Continental Copper & Steel Industries Inc.
Hanover, Penna.

Relative to quality control and the weaving of wire, would the comments made in the paper apply to metals other than aluminum, Mr. Hirt was asked. To some extent, he replied, but aluminum is more difficult to handle than copper, bronze or steel, so far as finished appearance is concerned. Steel is galvanized after weaving, bronze gets a varnished or painted finish, but aluminum retains the same characteristic appearance after painting. If it is so desired, it will reflect light and will show up if you get two wires on the warp. Tolerances are important, as differences in warp wires will show up if there is a 3, 4 or 5 thousandths variation.

★ ★ ★

Wire, if drawn to a 10 thousandths tolerance, does not require a selection of wire from stock. The company makes no selection, but holds to tolerances closely. As to reflection due to color differentials, the speaker said that if streaks are surface or superficial ones, the color makes little difference, unless it is in the material itself. Good cleaning is necessary, but they have found little color that is in the wire itself, as their suppliers have good quality control.

FERROUS DIVISION DISCUSSIONS

Monday Afternoon
October 14, 1957

Symposium on Plating Wire for Eye Appeal

PAPER: "Survey of Finishes and Processes"
by R. T. Gore
Market Development Engineer
Metal and Thermit Corporation
Rahway, New Jersey

PAPER: "Wire Suitable for Plating"
by H. P. Raffensberger
Metallurgical Supervisor
Bethlehem Steel Company
Sparrows Point, Maryland

PAPER: "Plating Wire for Eye Appeal"
by O. B. Lusk, Chief Inspector
United Steel and Wire Company
Battle Creek, Michigan

PAPER: "Plating Wire from the Consumer's Standpoint"
by L. L. Johnson, Engineering Specialist
Philco Corp.
Philadelphia, Penna.

John S. Corson, Ferrous Division Program Chairman, opened the symposium and introduced the panel members, the discussions of their papers following the paper presentations.

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A question for Mr. Raffensberger on the mechanics of controlling rolling temperature to control scale formation, brought out the fact that they use water on the rolls and check with an optical pyrometer at the reels. Coiling temperatures for rods to be drawn clean and extra bright are kept between 1400 and 1450°F.

★ ★ ★

For an average manufacturer who has just a tub for plating

chemicals, Mr. Gore said that to check concentration and temperature, a steam valve and a thermometer are necessary. Test kits are available for solution analyses. These will provide good results in most cases. Other variables, like current and voltage meters are necessary. Small plating operations can use a DC supply with a built-in rectifier for continuous control. In large operations, a step-type control is desirable. Voltmeters and ammeters usually come with the equipment.

★ ★ ★

Referring to Mr. Raffensberger's paper a member commented that it might be well to go back to the open hearth and let them know to what use the steel is to be put. Some of the new lubricants are rust preventives, which is better than oil, since in humid locations rust can start in 8 hours or less. Clean wire is important in plating. Another man said that soap lubricants were sometimes difficult to remove for good plating. Mr. Gore said that any drawing compound difficult to remove complicated the plating operation. Wire must be chemically clean. A small amount of Le Page's glue added to the lubricant helped in acid copper plating. With alkaline copper plating wetting agents are beneficial for cyanide copper solutions. No rust can be tolerated, although the ideal is seldom secured. Superficial rust can easily be removed by mild acid or cyanide treatment. Deeper rusting will make a satisfactory job difficult. Welds in such products as refrigerator shelves are hard to plate due to irregularity of surface and may offer a point for rusting to start.

★ ★ ★

Mr. Lusk was questioned about the alkali cleaner and the reverse current referred to in his paper. He said the reverse current brought dirt, scale and other foreign matter from the work into the solution. It also avoids hydrogen embrittlement.

★ ★ ★

To a question on causes of fuming in cyanide solutions, Mr. Gore said good ventilation was necessary. The chemistry of cyanide plating is complex. If one analyzes all the abrasive ingredients supplied and to be checked, there are still other ingredients in the bath resulting from the decomposition or oxidation of the cyanide—ammonia, chlorinates and other organic materials—and these may be responsible. Fuming is common and it comes and goes. Whatever the cause, some troublesome ingredient builds up a concentration that causes obnoxious fumes. Ammonia may be the cause of distress and it may be concealed by the odor of another chemical. Ventilation is the only cure. Too high a bath temperature may be the cause.

★ ★ ★

Smut is a problem coming from acid cleaning, Mr. Lusk said, and it is not hard to remove. Most of their wire is of uniform quality and most of their trouble is due, not to technical carelessness, but to careless handling of wire in trucks or cars.

PAPER: "Progress in Vertical Storage"
by A. F. Anjeskey, Sales Manager
Cleveland Tramrail Division
Cleveland Crane & Engineering Co.
Wickliffe, Ohio

Asked how the hook was gotten into the first bundle in the freight car, the speaker said the hook is attached to a rod 38 inches in diameter, 48 inches deep and the size is such that it enters the smallest coil. The pin is pointed and smooth and is good for aluminum, copper or other metals. Individual coils or 4000 lb. loads can be picked up. It is safer than the conventional hairpin hook, because the claws that expand to hold the load will not permit slippage as in the horizontal storage system. He said that most mills were behind the times in packaging their own products properly. After the load has been delivered to the cleaning house, it is only necessary to snap off the tying bands and there will be no wire snarls. Coils will expand upon being released and pins should be long enough to allow for at least a 9 inch spread. Bands for tying bundles, he felt, were better than wire. They cost more, but are worth it. The coils will give no trouble going through the cleaning house without ties. The pin load is taken off the vertical hook with a ram truck or placed on a cleaning house buggy and the man at the end of the cleaning house removes the ties and the coil spreads out—installations have given no trouble. Labor requirement for banding coils are less than hand-tying with wire. Many companies are now banding with automatic machines successfully. It saves storage space and higher piles can be made.

Tuesday Morning
October 15, 1957

PAPER: "Combined Hot Rolling and Patenting of Rod"
by Dartrey Lewis, Chief Engineer
Research & Development
John A. Roebling's Sons Corporation
Trenton, New Jersey

Asked about the type of take-up reel needed to carry the rod through the reel, the speaker said that at first they didn't know whether they could get the rod down to the 110 feet of guide pipe. It had to be cooled. Morgan Construction Company worked out a plan to put a pinch roll half way down and they found it would go down with the water on. Special nozzles were used to make the water flow at the speed of the rods. The only problem in the guide pipes comes from broken ends of rod, caused by the hot rolling. Operations are done with No. 6 rod, since these are the only ones patented. No. 5 rod has been tried. It works just as well, but at slower speeds. As to grain size from the 1800° rolling temperature (1600° being usual), it was said no effect was noted and the grain size was not much larger.

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If finishing speeds were 5000 F.P.M. instead of 4000 the only difference would be that the guide pipe would have to be multiplied by 5 over 4 to give the same cooling time, but this has not been tried. For pouring reels the limit is about 4000 F.P.M., but for laying reels speeds of 6000 F.P.M. are possible; this might affect the 5000 foot question.

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Probably the automatic temperature control could be improved by having refractory ovens on the bottom plate and a refractory in-

sert on the guide pins; this has not been done yet.

PAPER: "A Simplified System for Carbon Restoration."
by John Arnold, Chief Engineer
Lee Wilson Engineering Company
Cleveland, Ohio

It was mentioned in the paper that spheroidizing can be done along with carbon restoration. A questioner said they had trouble with redecarbing at the 1500° cycle because of moisture in the atmosphere. The speaker said they can take the temperature of 1500° to 1550° and pass cool down to 1150 or 1200° and then come back to the spherodizing cycle with just inert gas in it. Moisture can be purged out with dry nitrogen gas. This gives 2 cycles, but the furnace is not uncovered. On over-restoration on C 1039, which resulted in 90 carbon steel, Mr. Arnold said a correct amount of natural gas addition would avoid this. For basic control of C 1035 for cold heading, to get 30 carbon steel a gas mixture of 30% is needed. For 100 carbon, 23% is used. A three hour soak is sufficient. Exhaust point gas should be gotten down to plus 15. The system is less touchy than where an endothermic generator is used.

PAPER: "Furnaces for the Heat Treatment of Wire"
by John P. Zur, Engineer
Non-Ferrous and Wire
Industrial Furnace Division
Sunbeam Corporation
Chicago, Illinois

In the metallic radiant tubes, the 3315 and 2512 alloys commonly used have a definite maximum operating temperature. With silicon carbide, much higher operating temperatures can be used, Mr. Zur advised in response to a question.

Tuesday Afternoon
October 15, 1957

PAPER: "The History of and New Developments in Wire Packaging"
by Fred J. Bieber, President
Acrometals Products, Inc.
Minneapolis, Minnesota

When cooling the ACSR wire, how was the empty rod taken off without stopping the wire? To this the speaker replied that this is being worked on, as most buildings in which galvanizing equipment is installed are not adaptable to the equipment mentioned in the paper. The principle is to pull the wire off the galvanizing block onto a capstan and transport the capstan to the spooling equipment, which will put the wire on a reel. A footage meter is used on the spooling machine and any resulting scrap is better off in the mill than in the customer's plant.

★ ★ ★

This type of reel is being used for .62" x ¼" width flat wire in coil weights of 300 to 600 lbs. An application also would be for square non-ferrous wire.

PAPER: "Wire Packaging System"
by E. Jefferson Crum
Riderwood, Maryland

On how fine a wire the system could be used, Mr. Crum said they had gone down to .023 inches. It could be used on any wire normally put on an 8" rotating block.

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No trouble has been experienced with wire dropping off the block. There is no problem in controlling the flow of wire from the upside-down block. A winding head can be used as a measuring head. With an 8" block, it is possible to come within 2 feet.

★ ★ ★

As to trouble in getting the cast on high carbon or spring wire, he said that knowing the limitations of a dead block, since wire would be collected beneath a dead block, it is quite probable that a great many types of wires could be handled on which the system hasn't been tried. In paying out, there is good control and the mere fact that a wire has a 300,000 lb. tensile does not mean it can't be paid off without a core.

★ ★ ★

While square wire is strapped, wire in a circular package needs support on the outside, one of the proposed methods being to use a wirebound box with slats on the outside to support it. Coils have been strapped in various ways and shipped successfully—the solution of this problem is one for the packaging boys.

★ ★ ★

Maximum speed of packaging is controlled by the speed with which a flyer can be rotated on a dead block. Some are running 2000 F.P.M., but this might be raised to 4000 or 5000. A head being made and tested has gone faster than 2000 F.P.M.

PAPER: "Recent Developments in Steel Wire Drawing Machinery"
by James E. Spearman
Assistant to the President
and
Maurice A. Nye, Chief Engineer
The Vaughn Machinery Company
Cuyahoga Falls, Ohio

On the Motoblox machine, a member asked what is done to prevent contamination, to which Mr. Spearman replied that air is taken in under pressure from the outside, so that no dirt gets into the chamber where the generators are located.

PAPER: "A Weldable, Hardenable 12% Chromium Alloy"
by W. R. Kegerise
Metallurgist—Development
The Carpenter Steel Company
Reading, Penna.

With four analyses shown, a member asked what variations in chromium could be expected, on which the speaker commented that chromium affected the structure and the analysis had to be fairly restricted because of the forming of ferrite. Normal limits in melting are approximately 11 to 12-½ per cent on molybdenum. With the increase, it is necessary to use more nickel to balance the alloy. Aluminum is residual—normally around 3 to 6%.

Wednesday Morning
October 16, 1957

PAPER: "Appropriate Rods for Appropriate Wire"
by Ivan P. De Witte, C. E.
Chief Project Engineer
Trefileries Leon Bekaert
Zwevegem, Belgium

Asked about mechanical scaling,

(*Please turn to page* 103)

The Annual Convention of The Wire Association

by Edmund D. Sickels, Editor
WIRE AND WIRE PRODUCTS
Stamford, Connecticut

While not a record-breaker in attendance, the 1957 Annual Convention in Chicago was one that was highly satisfactory. Some 605 persons registered, as compared with 654 in 1956.

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The Convention, which ran from October 14th through the 17th at the La Salle Hotel, got under way officially at 9:00 A.M. with the opening of the registration desk.

Board of Directors Meeting

The regular semi-annual meeting of the Board was called to order at 10 o'clock by its chairman, **Tom M. Girdler, Jr.,** who currently is serving as President of the Association.

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Both the minutes of the previous meeting and the report of the Secretary-Treasurer were read by **Richard E. Brown** and approved by the directors as read.

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John L. Sanderson, General Program Chairman, was called upon to report on the convention program. He called attention to the program as printed, said he considered it a good one and that any credit for it belonged to the ferrous and non-ferrous program chairmen and their committees.

★ ★ ★

Mr. Brown reported on the Smoker-Dinner show for **Eber J. Hubbard.** The dinner, he said, had gone up in price and the acts were costing somewhat more, but would be comparable in quality to previous shows.

★ ★ ★

Mr. Girdler asked **Allan B. Dove** to make the report of the Nominating Committee for Directors. He named:

John L. Sanderson
General Program Chairman

Harold W. Adams,
Production Supervisor,
Cable Div., Reynolds Metals Co.,
Louisville, Ky.

Frank Ashworth,
Production Controller,
Canada Wire and Cable Co., Ltd.
Toronto, Canada.

John H. Corson,
Manager of the Laboratory
Carpenter Steel Company
Reading, Pa.

William L. Dull,
Supt., Wire Mill,
Sheffield Div., Armco Steel Corp.
Houston, Texas

James S. Higgins,
Plant Engineer,
Walker Brothers, Copper Div.
Conshohocken, Pa.

W. Roy Mackay,
Supt., Rod and Wire Mills,
Bethlehem Steel Company
Sparrows Point, Md.

David M. Schmid
President and Treasurer
Techalloy Co., Inc.
Rahns, Pa,

Marshall V. Yokelson,
Research Metallurgist,
General Cable Corp.
Bayonne, N. J.

★ ★ ★

J. Edward Donnellan read the tellers report of the results of the mail ballots received from members, which showed that 708 members had voted unanimously for their election, 645 being necessary for election.

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Upon a motion duly made, seconded and passed, President Girdler directed the Executive Secretary to cast one ballot in favor of the seating of these gentlemen, which done, they were formally seated as directors for the terms of office to which they had been elected.

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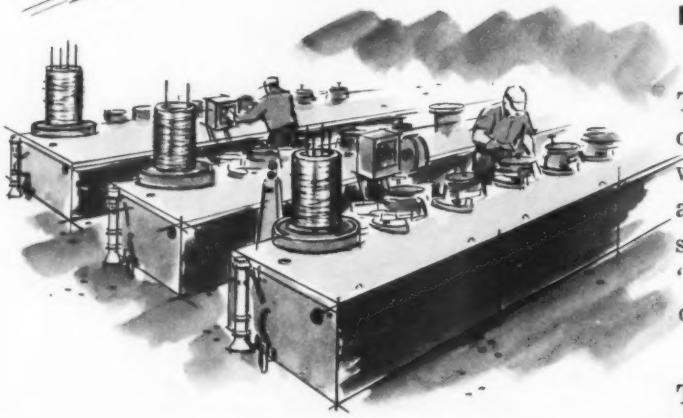
Mr. Sanderson, as Chairman of the Committee for the Nomination of Officers, reported the selections for the coming year. These were **Tom M. Girdler, Jr.** for President; **Hugo W. Biskeborn** for Vice President, Non-Ferrous Division; **Allan B. Dove** for Vice President, Ferrous Division; and **Richard E. Brown** for Executive Secretary and Treasurer. Upon a motion to elect this slate, seconded and unanimously passed, these men were elected for 1957-1958.

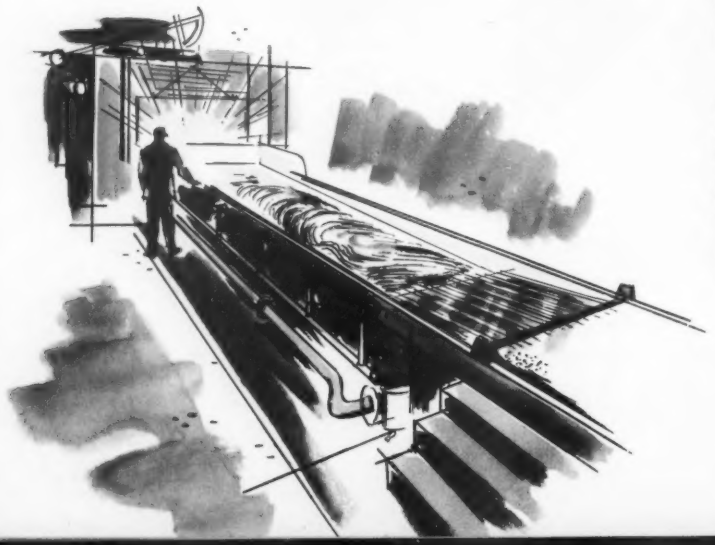
★ ★ ★

Mr. Potter as Chairman of the Nominating Committee for the Executive Committee made his recommendations which were accepted and **R. S. Worth, H. W. Biskeborn, A. B. Dove, A. M. Reeder** and **T. M. Girdler, Jr.** (ex-officio) were elected. Mr. Potter also extended an invitation to all to come to Los Angeles to attend the Regional Meeting to be held there in June. Mr. Girdler appointed the Membership Committee for three years, which nominations were approved, consisting of **Sidney Rolle, Leonard C. Crewe, Jr., Leslie C. Whitney** and **James E. Flood.**

When you need wire . . .

make CF&I YOUR





New, improved facilities

CF&I's wire plants throughout the nation have been modernized to provide even greater benefit to customers for all types of wire. Open hearth capacity has been increased—rolling mills completely restyled—new wire drawing machines have been added—enlarged tempering and patenting furnaces installed.

Modern packaging methods

To supply CF&I Wire to customers in the type of package that best meets their requirements, we have new spoolers, steel strapping machines and additional packaging equipment. We can supply wire in continuous lengths on reels, "spiders", pallets, or in fibreboard (pay-off pak) containers.

This equipment, plus the skilled craftsmanship of our metallurgists and mill men, enables us to meet the most exacting specifications and to provide faster deliveries to wire users everywhere.

Whether you order in small lots or by the carload, you are certain of receiving prompt, dependable service—in damage-free (DF) cars, too, when requested. Let us know your requirements.

R SOURCE OF SUPPLY

Non-returnable spiders
(500-700 lbs. capacity)

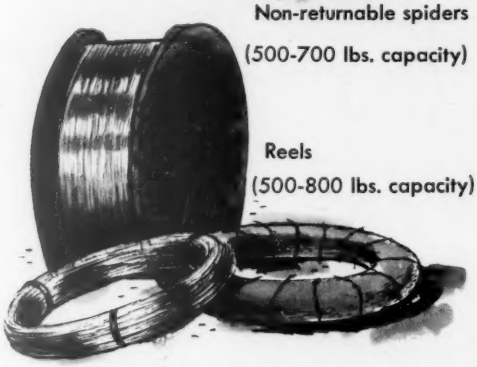
Here is a partial list of the many types of carbon steel wire manufactured by CF&I:

Grades

low carbon
annealed
flat and shaped
medium high carbon
high carbon
flat and shaped
oil tempered
spheroidized

Finishes

bright dry drawn or lime bright
bright grease drawn
cadmium coated
coppered
extra clean smooth bright
galvanized
liquor
white liquor



Reels
(500-800 lbs. capacity)

Steel strapped or paper wrapped coils

Standard Types (partial list)

aircraft cord
bee
bobbin ring
bobby pin
bookbinder
broom
brush
casing
clip
concrete reinforcing tie
cotter pin
curtain spring
die spring
fine & weaving
fuse
Gamma spring
garment hanger
glass netting
hair pin
hat
hose, reinforcement
hose, mechanical
hose, vacuum
lock spring
lockwasher
manufacturers' drawn
mattress
merchant
nail
oil tempered
picker tooth
picture cord
pin ticket
regulator
rope
safety pin
screen
shaft, flexible
Signal Corps
snake fishing
spiral binding
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square
stapling
staple
stone
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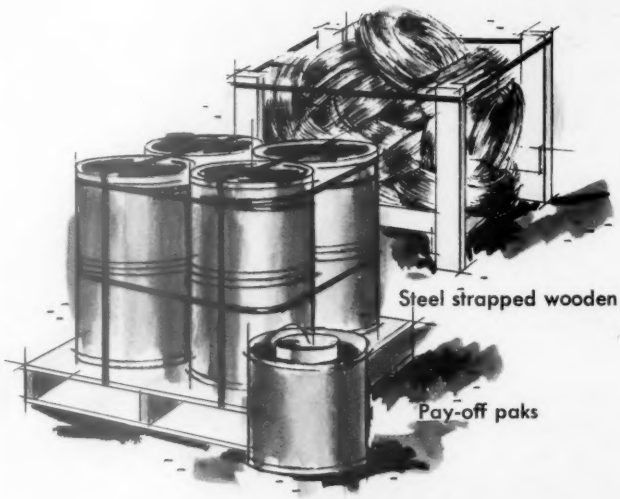
twisted & laid
upholstery
valve spring
weaving
welding
Wissco Iron



Steel strapped wooden rack

Pay-off paks

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo Salt Lake City • Wichita • **PACIFIC COAST DIVISION**—Los Angeles • Oakland • Portland • San Francisco San Leandro • Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo Chicago • Detroit • New Orleans • New York • Philadelphia • **CF&I OFFICES IN CANADA:** Montreal Toronto • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg

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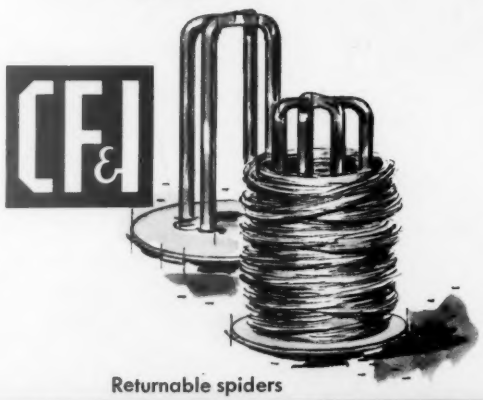

Returnable spiders

President Girdler presented a proposed renewal contract for the management of the Association with the **Quinn-Brown Publishing Corporation,** and **Richard E. Brown,** to run for 5 years, with a renewal option for a like period, the contract being approved and ordered signed after discussion.

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The Medal Award Committee was reappointed for another year, with David M. Schmid continuing as Chairman, with a vote of thanks for the fine work it had done on the 1956 paper.

★ ★ ★

It was announced that arrangements had been made for the holding of the 1958 Convention in Hadden Hall of the Hotel Chalfont-Haddon Hall in Atlantic City, N. J. from October 13th through the 16th, the Smoker-Dinner to be held in the Chalfonte section.

★ ★ ★

Raymond S. Worth, Manufacturing Manager, **John A. Roebling's Sons Corp.,** Roebling, N. J., was appointed General Program Chairman for the 1958 Convention with the Board's approval.

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It was voted that hereafter all authors of Convention papers receive complimentary registrations and be invited to attend the Annual Directors' Luncheon as guests of the Association.

★ ★ ★

It was further voted that hereafter each Medal Award winner should receive, in addition to the medal and certificate, a check for $100.00 and that each Honorable Mention Certificate should carry with it a cash award of $50.00.

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Regional meetings, it was decided after discussion, are to be held at the Statler Hotel, Buffalo, N. Y., on May 1 and 2, 1958, and in June in Los Angeles, Calif. **Fred A. Webber,** Chief Metallurgist, **Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.,** was named Program Chairman for the Buffalo meeting.

★ ★ ★

Leslie C. Whitney, as Chairman of the Board of Past Presidents, announced the Board's selection of **D. D. Buchanan,** Past President, as the 1958 Mordica Memorial Lecturer.

★ ★ ★

After consideration of other matters, a motion was made to approve the acts of the Officers and Directors during the preceding 12-month period, which was seconded and approved. Mr. Girdler expressed his personal appreciation of the excellent support and cooperation given him during the last year and there being no other business, the meeting was adjourned at 12 o'clock noon.

The Directors' Luncheon

Upon adjournment the Directors repaired to the Illinois Room at noon on October 14th to meet and have lunch with the program participants—those serving on program committees and those present at the Convention to present papers.

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President Girdler spoke briefly, welcoming the program men to the Convention and voicing his appreciation of the vast amount of work that had gone into the arranging of the program and the preparation of the papers. He said that it was through such cooperation that the growth of the association had been made possible.

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John L. Sanderson, General Program Chairman, addressed the gathering of 65 persons, expressing his thanks to his committees and the speaker for their fine work in preparing for the technical sessions. He introduced and called upon **John H. Corson,** Ferrous Program Chairman, and **E. D. Bent,** Non-Ferrous Program Chairman, who in turn each asked their committee members to stand and thanked them for their cooperation. By the time the luncheon was over, the technical sessions were about to be opened.

The Technical Sessions

The Technical Sessions for the Ferrous and Non-Ferrous Divisions were held simultaneously in different meeting rooms, starting on Monday afternoon, October 14th and running through Wednesday morning, October 16th. These sessions occupied the full attention of those in attendance throughout this period. For complete details regarding the meeting chairmen, the speakers and the topics covered, readers are referred to the Convention Program starting on page 1242 of the October issue of **Wire and Wire Products.**

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One change in this program should be noted. **Kenneth J. Sorace,** Chief Project Engineer, **The Lamson & Sessions Co.,** Cleveland, Ohio, who was listed as co-author of a paper on the "Mechanical Blast Cleaning of Wire Rod," delivered a paper of his own on this subject.

The Annual Luncheon

This annual feature of the Association's program was attended by 330 persons. After the serving of the luncheon President Girdler greeted the assemblage, noting that the current membership of the Association had risen to 1282, 150 of whom held memberships in countries outside of North America.

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He regretted the absence of **Clem McGowan,** our honorary life Director, who for so many years has been faithful in attendance. He said that we lived in a state of change and what we are doing today, we will not be doing tomorrow and that it was a fine thing to get together at our conventions to talk with competitors and discuss mutual problems.

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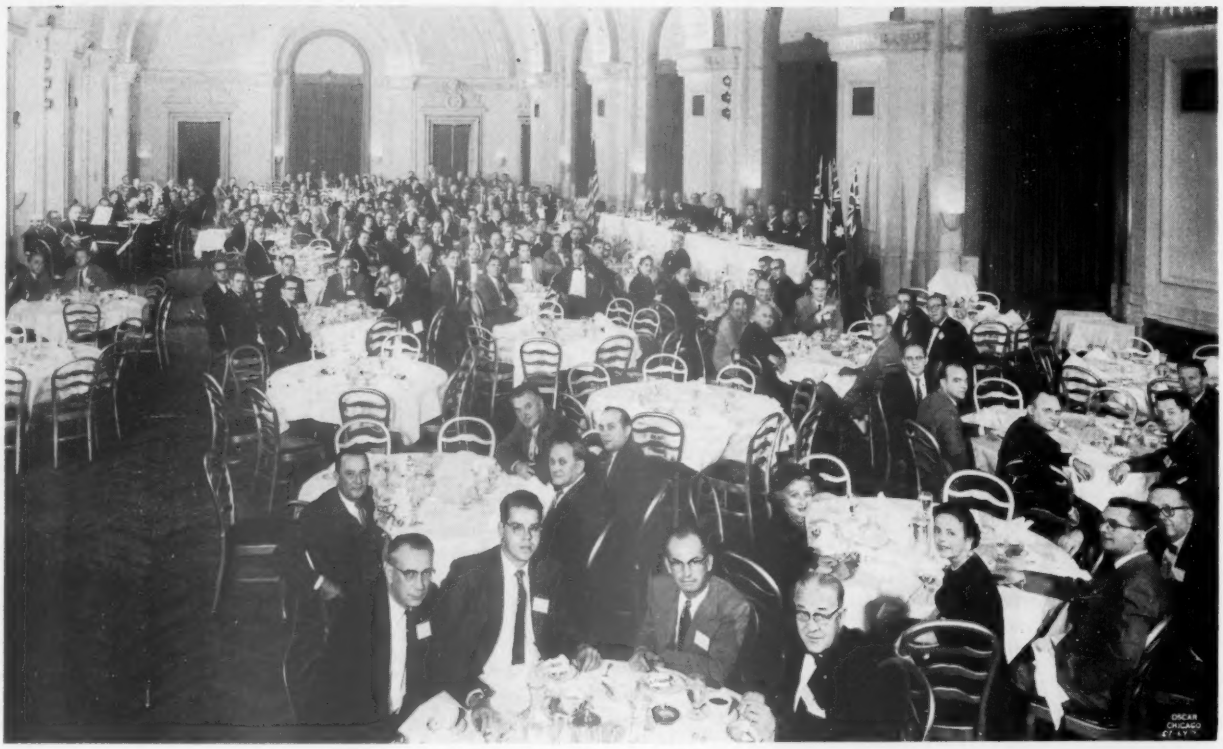
Mr. Girdler then introduced those seated at the Speakers' table and called upon **David M. Schmid** to make the several awards selected by the Committee on Awards, of which he is Chairman. Medal Awards were given, in the Ferrous Division, to **George A. Sweitzer, Jr.,** Metallurgical Investigator, **Jones and Laughlin Steel Corp.,** Aliquippa, Pa., for his paper: "Electromatic Oil Tempered Wire," and, in the Non-Ferrous Divison, to **John D. Sprowl,** Department of



The Annual Luncheon of The Wire Association, LaSalle Hotel, Chicago, October 16, 1957

Metallurgcal Research, **Kaiser Aluminum & Chemical Corp.,** Spokane, Wash., for his paper: "Hot Dip Aluminizing Processes and Alloys." He then presented a Ferrous Division Certificate of Honorable Mention to **N. Dale Montgomery,** Metallurgist, Rod and Wire Div., **Pittsburgh Steel Company,** Monessen, Pa., for his paper: "Control Measures for the Heat Treatment of High Carbon Rods and Wire."

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Next, a Certificate of Honorable Mention for an outstanding paper in the Non-Ferrous Division was presented to **Benjamin H. Davis,** Vice President, **The Davis-Standard Division, Franklin Research Corp.,** Mystic, Conn., for his paper: "Temperature Control for Thermoplastic Extruders."

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Leslie C. Whitney, as Chairman of the Board of Past Presidents, was asked to make the presentations of the Twenty-Five Year Certificates to those who in 1957 had been members continuously for this period. He awarded such certificates to:

William M. Akin, President
Laclede Steel Co., St. Louis, Mo.

W. Roy Mackay, Superintendent,
Rod and Wire Mills
Bethlehem Steel Co.,
Sparrows Point, Md.

Earl R. Potter, Pres. and Genl. Mgr.,
Industrial Wire Products Corp.
Los Angeles, Calif.

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The luncheon's official program concluded with the introduction of **Richard E. Brown,** Executive Secretary of **The Wire Association,** Stamford, Conn., by President Girdler. Mr. Brown gave the Mordica Memorial Lecture, which he had entitled "About The Wire Association." The lecture, which is printed in full in this, the January Convention Proceedings Number of Wire and Wire Products, concluded the annual Luncheon program.

The Annual Meeting of Members

At 4:00 P.M., President Girdler called this meeting to order. A quorum being present the Secretary-Treasurer, Mr. Brown, read the minutes of the last meeting and gave the Treasurer's Report. Both were approved as presented. Mr. Girdler called attention to the renewal of the contract between the Association, the **Quinn-Brown Publishing Corporation** and Mr. Brown, to the authorization by the Board at its meeting on Monday of cash awards as well as certificates and medal awards, to the increase in the Board's membership from 18 to 24 members, so that the Non-Ferrous Division was now strongly represented, and to the new officers and directors elected for the year 1957-1958.

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Other actions of the Board at Monday's meeting were detailed.

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A motion was made and passed to have the Executive Secretary send a telegram of regret to **Clem McGowan** on his inability to be with us in Chicago this year.

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Another motion, duly approved, was made to express the appreciation of the Board and the Convention members to the Program Committees and to all who had participated in the program in any way.

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(*Please turn to page* 99)

Crystallography of Cold Drawn Music Wire

by

H. C. Burnett, Metallurgist and C. J. Newton, Physicist

Mechanical Metallurgy Laboratories

National Bureau of Standards

Washington, D. C.

The National Bureau of Standards has completed an investigation of preferred crystal orientation in cold drawn music spring wire. Sponsored by the U. S. Army Ordnance Corps the study revealed that the degree of preferred crystal orientation and the elastic modulus of the wire first increase, then decrease, as diameter is reduced in the drawing process. The tensile strength of the wire increased with each reduction in size, as expected, but exhibited no correlation with changes in either the preferred orientation or the modulus of elasticity.

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Many modern ordnance devices such as machine guns and small arms are dependent on helical wire springs for their operation. Music wire is most frequently used for these springs because it is the strongest economical engineering material available. The usual fabrication procedure for music spring wire involves a heat treatment known as patenting followed by drawing through a series of dies to obtain the desired size and tensile strength. The plastic deformation of the metal during the drawing operation causes the individual crystals to rotate so that their crystallographic axes tend toward certain preferred directions. As the properties of the crystals are different in different directions, the development of a preferred orientation in a metal specimen causes the properties of the specimen to vary with direction. It was believed that information on changes in preferred orientation and elastic modulus occurring during wire drawing would aid in obtaining a better understanding of the structural changes taking place in the steel.

For further technical information, see "Variations in Preferred Orientation and Modulus of Elasticity in Cold Drawn Music Spring Wire" in Wire and Wire Products, November, 1955.

Table I. Tensile strength of cold-drawn music wire at various stages of reduction

Wire Diameter (in.)	Reduction in Diameter (percent)	Tensile Strength (lb/in²)
.111	-	206,000
.101	9.0	229,000
.091	18.0	236,000
.082	25.1	244,000
.074	33.3	254,000
.066	40.5	264,000
.059	46.8	278,000
.053	53.2	292,000
.047	57.7	312,000
.044	60.2	322,000
.041	63.0	332,000
.039	64.8	350,000

Figure 1—Making X-ray diffraction measurements on samples of cold drawn music spring wire at the National Bureau of Standards. The study showed how crystal orientation changes as the wire diameter is reduced in the drawing process.

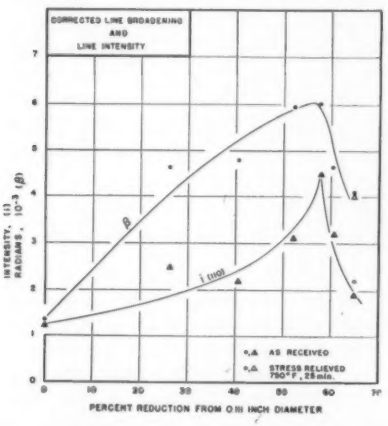

Figure 2—Graph of corrected line broadening and intensity of the diffraction from the (110) plane of music spring wire at various stages of reduction. Specimens were cut transversely across the axis of the wire.

Commercial-grade wire drawn from steel of 0.85% carbon content was used in the investigation. The patented wire had a diameter of 0.111 inch, and 11 dies were used in reducing the wire to the final size of 0.039 inch.

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The degree of preferred orientation was determined on seven sizes of wire and on an 0.039-in.-diameter specimen which was stress-relieved by heating at 750°F. The

(*Please turn to page* 112)

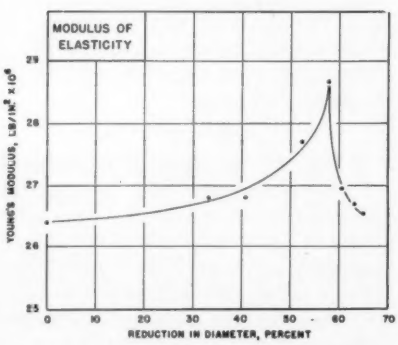

Figure 3—Graph of modulus of elasticity of music wire at various stages of reduction.

The Cabling-Time Equation

by Sam Kalifon, B.Ch.E., Project Engineer
Hatfield Wire and Cable Division
Continental Copper & Steel Industries, Inc.
Hillside, New Jersey

The cabling-time equation is an expression that relates the number of hours required to form 1000 feet of a cabled assembly from n lengths of individual conductor, with such variables as length of lay, machine characteristics, reel capacity, et al.

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Schematically, the machine employed for this purpose consists of

(1) A set of cradles, each of which holds one payoff reel containing a specified length of single, untwisted conductor, the function of which is to supply the individual elements entering into the final cable assembly;

(2) A head, through which the n conductors feed, which rotates with some fixed angular velocity, the function of which is to twist the elements into their ultimate configuration;

(3) A train of gears through which the head and the take-up reel are mechanically coupled, the function of which is to relate the linear velocity of the completed assembly with the angular velocity of the head to produce the required length of lay; and, finally,

(4) A take-up reel upon which the cabled assembly is wound.

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The foregoing description is purely schematic and lists only those machine elements that are common to all fill and twist machines, and consideration of which naturally enters into the ensuing mathematical discussion.

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The time in hours required to manufacture 1000 feet of cabled assembly is

$$T_t = T_c + T_d + T_s$$

where

T_t = total time required to make 1000 feet of finished cable

T_c = operational time in hours per 1000 feet of finished cable

T_d = down time in hours for reel changes and filler replacement, per 1000 feet of finished cable

T_s = original set-up time in prorated hours, per 1000 feet of finished cable.

The equations presented here are general and their application to a shop problem make possible advance determination of the labor involved in cabling together any number of conductors, thus eliminating an expensive time-study of every possible combination of conductor diameter and length of lay, unless such a study is felt to be desirable as a countercheck on the mathematical calculations involved.

Evaluation of T_c

Let R = revolutions per minute of the rotating head, and
L = length of lay, in inches, of the finished cable

then, since each revolution of the head implies that L inches of cable have been finished,

$60(RL/12) = 5RL$, feet of finished cable made in one hour

$T_c = 1000/5RL$, or, $200/RL$, operational time, hours per 1000 feet

Evaluation of T_d

At time T_o, each pay-off reel is full. After some length of time, yet to be determined, it will be empty. At this time the machine must be stopped and the pay-off reels replaced before operations can be resumed. The operational intervals are obviously a function of both pay-off reel capacity and rate of pay-off. In extreme cases, where the former is small and the latter large, it is entirely possible for T_d to exceed T_c in magnitude and may not, therefore, be neglected.

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Let C represent the capacity of the pay-off reel in feet and r the rate of pay-off in linear feet per minute. It is evident that the numerical value of C depends on the physical dimensions of the reel used. Its maximum value is fixed by the largest reel that the cradles can accommodate. Below this maximum, any of an infinite variety of reels may be used and no attempt, therefore, will be made to express C in terms of more fundamental quantities. A formula will be given at the close of this article by means of which this numerical value can be determined from the face and core diameters and the length of traverse for any given reel.

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The rate of payoff, r, is a function of the processing speed of the cabled assembly, since the completion of L feet of the final product implies the withdrawal of L′ feet of untwisted element from each pay-off reel.

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A cross-section of the finished

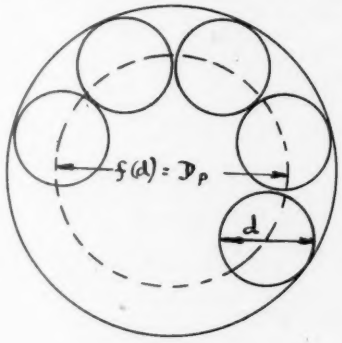

Figure I

cable is shown in Figure I, where

d = OD, inches, of a single conductor, and,

Dp = Pitch diameter, inches, of the finished cable

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In Figure II is shown a unit

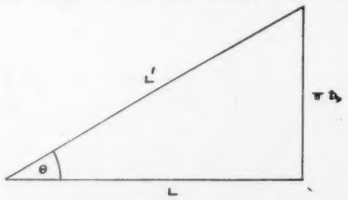

Figure II

length of the finished cable, with the axis of one of the conductors unwound and laid straight at an angle Θ to the axis of the finished cable.

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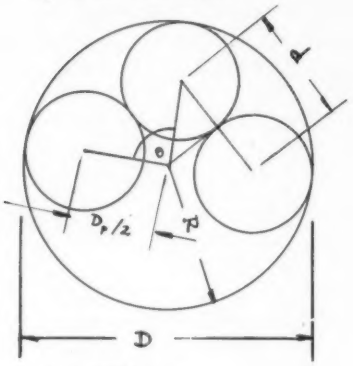
Obviously, for each finished length of L inches, L′ inches of single conductor are withdrawn from each pay-off reel, so that

$$L' = L/\text{Cos}(\text{arc tan } \pi D_p/L)$$

however,

$$D_p = d/\text{Sin}(180/n), \text{ for}$$



$$\Theta = 360/n, \text{ or}$$

$$\Theta/2 = 180/n$$

$$\tfrac{1}{2}d/\tfrac{1}{2}D_p = d/D_p, \text{ or } \text{Sin}(180/n), \text{ and,}$$

$$D_p = d/\text{Sin}(180/n)$$

also,

$$R = D_p/2 + d/2$$

$$D = D_p + d$$

$$= d/\text{Sin}(180/n) + d$$

$$= d\left[1 + 1/\text{Sin}(180/n)\right]$$

Therefore,

$$L' = L \text{ Sec } \left[\text{arc tan } (\pi d/L \text{ Sin}(180/n))\right]$$

and the ratio of length of single conductor per unit length of finished cable is

$$\rho = \text{Sec } \left[\text{arc tan}(\pi d/L \text{ Sin}(180/n))\right]$$

Hence, for each thousand feet of finished cable

$$F = 1000 \text{ Sec } \left[\text{arc tan } (\pi d/L \text{ Sin}(180/n))\right]$$

feet of single conductor are withdrawn from each pay-off reel. Further, since each pay-off reel has a capacity of C feet, it contains enough single conductor to make thousands of feet of finished

$$L' = (C/1000) \text{Cos } \left[\text{arc tan } (\pi d/L \text{ Sin}(180/n))\right]$$

cable.

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If it takes an average of m minutes to make one reel change and there are a total of n + 1 reels that must be periodically changed — where the additional 1 takes the take-up reel into account — then one complete change will require (m/60)—(n + 1) hours. The number of hours of down-time, therefore, per 1000 feet of finished cable is

$$T_d = (m/60)(n+1)/L'$$

$$= (m/60)(n+1)(1000/c) \text{Sec } \left[\text{arc tan } (\pi d/L \text{ Sin}(180/n))\right]$$

and since,

$$\tan^2 \Theta + 1 = \text{Sec}^2 \Theta$$

$$T_d = (16.67m/c)(n+1) \cdot \sqrt{\left[\frac{\pi d}{L \text{ Sin}(180/n)}\right]^2 + 1}$$

or, alternatively,

$$T_d = (16.67m/c)(n+1) \cdot \sqrt{(\pi/L)^2 (D-d)^2 + 1}$$

Evaluation of T_s

Let T'_s = Total hours required to initially set up the twist and fill machine.

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This will account for all the hours required to clear the machine of the materials from the previous run, to change gears, to equip with filler cones and take-up reel, etc., etc. The value of T′ is determined by direct observation so that once established, it is adopted as a constant of operation for all time. No attempt is made here to express this term analytically, since it is extremely particularized and completely dependent on factors specific to a given machine. Having established T'_s, however, the value of T_s, is obtained by dividing by Q, the number of thousands of feet per individual run. That is,

$$T_s = T'_s/Q$$

In the extreme case, where a machine has been set up to run a given product indefinitely, T_s becomes vanishingly small and may, under these circumstances, be neglected. On the other hand, when the run is short T_s may become large enough to sensibly affect the value of T_r.

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By collecting all preceding terms, it is apparent that

$$T = K\left[\frac{200}{RL} + \frac{16.67m(n+1)}{C} \cdot \sqrt{\left[\frac{d}{L \text{ Sin}(180/n)}\right]^2 + 1} + T'_s/Q\right]$$

into which an efficiency coefficient has been introduced to account for unpredictable time losses such as mechanical failure, cable breaks, supply delays, etc, etc.

T = total hours required to make 1000 feet of finished cable
L = length of lay, inches
K = efficiency coefficient
R = RPM of rotating head
m = average number of minutes to make 1 reel change
n = number of conductors in the finished cable*
C = capacity of each pay-off reel, feet
d = OD of each elemental conductor, inches
T'_s = total initial set-up time, hours
Q = thousands of feet of finished cable, per run.

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***Although** not explicitly stated, this is meant to represent the number of conductors in one layer, since the cycle of operations, the time for which is represented by T, must be repeated for each layer.

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The foregoing, completely general equation may be used for determining the value of T in any cabling operation. However, to render it more facile in use, it may be rewritten in the following form:

$$T = K\left[\frac{200}{RL} + a \cdot \frac{m}{c} \cdot \sqrt{b^2 \cdot (d/L)^2 + 1} + T'_s/Q\right]$$

where

$$a = 16.67(n+1)$$

and

$$b = \pi/\text{Sin}(180/n)$$

for any value of $2 \leq n \leq 33$, values

of a, b, and d are listed below.

n	a 16.67(n 1)	b /Sin(180/n)	b^2
2	50.01	3.1416	9.8697
3	66.68	3.6276	13.159
4	83.35	4.4429	19.739
5	100.0	5.3447	28.566
6	116.7	6.2832	39.479
7	133.4	7.2404	52.423
8	150.0	8.2090	67.388
9	166.7	9.1860	84.383
10	183.4	10.167	103.37
11	200.0	11.148	124.28
12	216.7	12.139	147.36
13	233.4	13.123	172.21
14	250.1	14.106	199.01
15	266.7	15.111	228.34
16	283.4	16.103	259.31
17	300.1	17.102	292.48
18	316.7	18.087	327.14
19	333.4	19.098	364.73
20	350.1	20.087	403.49
21	366.7	21.085	444.58
22	383.4	22.077	487.39
23	400.1	23.049	531.26
24	416.8	24.073	579.51
25	433.4	25.072	628.61
26	450.1	26.093	680.84
27	466.8	27.060	732.24
28	483.4	28.025	785.40
29	500.1	29.008	841.46
30	516.8	30.063	903.78
31	533.4	31.013	961.81
32	550.1	32.003	1024.2
33	566.8	33.078	1094.2

The foregoing, then, is the general equation in its parametric form, with parameter values of a and b given in the preceding table.

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It is also true, that in most cabling problems, the lay is generally specified as some multiple of layer diameter, i.e.:

$$L = K_1 D$$

since,

$$D = d(1 + 1/\mathrm{Sin}(180/n))$$

$$L = K_1\, d(1 + 1/\mathrm{Sin}(180/n))$$

and

$$d/L = 1/K_1\ (1 + 1/\mathrm{Sin}(180/n))$$

With this requirement presumed to exist, the parametric equation can be further simplified to

$$T = K(f/d.R + mg/C + T_s'/Q)$$

where,

$$f = 200(d/L)$$

and,

$$g = a\sqrt{b^2\ (d/L)^2 + 1}$$

the values of f, g, and K, are listed in Table appearing on page 97.

If it is assumed that the value of Q is the number of thousands of feet of finished cable manufactured in an eight hour shift, then,

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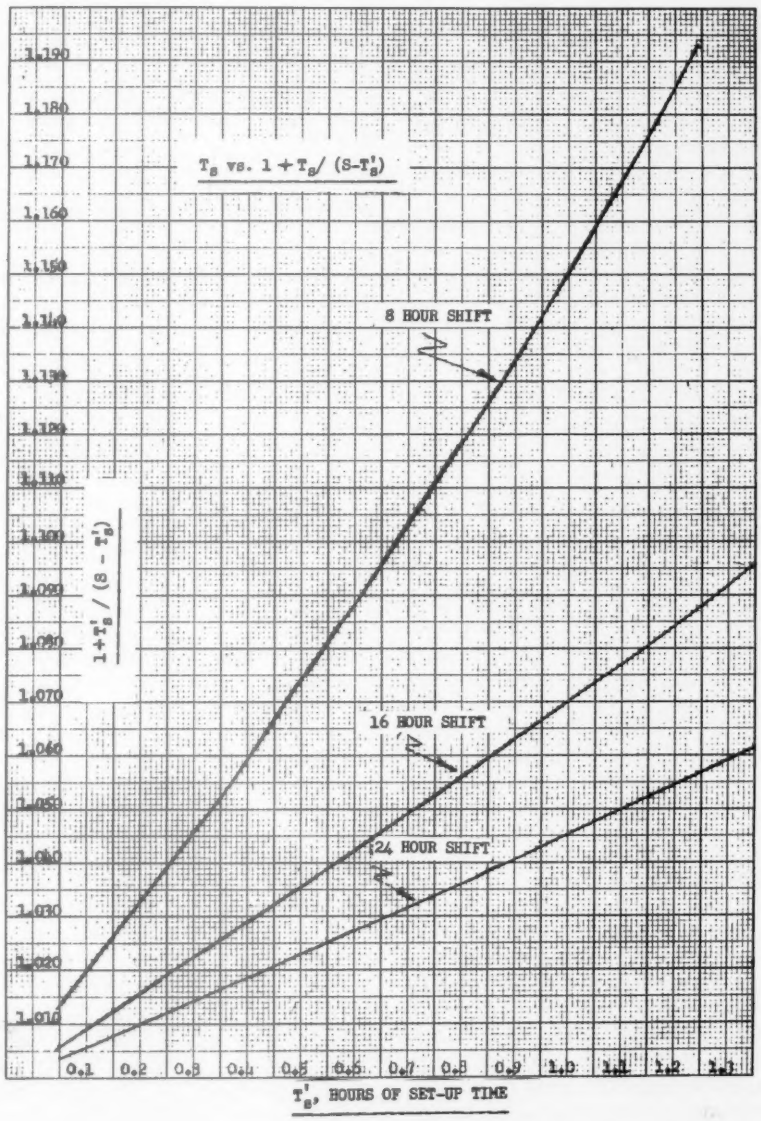
The effect of set-up time in increasing T, and therefore the cost of production, is shown in the ac-

(*Please turn to page* 97)

$$\begin{aligned} f/dR + mg/C &= T_f - T_s'/Q \\ &= 8 - T_s'/Q \\ Q(f/dR + mg/C) &= 8 - T_s', \text{ or,} \\ Q &= \frac{8 - T_s'}{f/dR + mg/C}, \quad \text{and,} \\ T &= K \cdot \left[f/dR + mg/C + \frac{T'(f/dR + mg/C)}{8 - T_s'} \right] \\ &= K(f/dR + mg/C) \cdot \left[1 + \frac{T_s'}{8 - T_s'} \right] \end{aligned}$$



The Interrelationship Between Density and Dielectric Strength of High Pressure Polyethylene For High Voltage Applications In Insulated Wires

by Albert S. Silver, Chief Chemist

Royal Electric Corporation

Associate of The International Telephone & Telegraph Corporation

Pawtucket, Rhode Island

Foreword

This paper was initiated by the observations on GTO-15 P.E. insulated cable conforming to "Standard for Gas-Tube-Sign and Ignition Cable" by Underwriters' Laboratories, Inc.

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It was noticed in the early stages of production development that cable which one week after manufacture had failed the extended voltage test, passed after a natural aging of two months.

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This started a program by the laboratory to find an explanation for this coincidence.

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The chemical and physical information that follows, was collected from publications that have been printed by the leading manufacturers of polyethylene resin to aid the processor in understanding this polymer. This has allowed him to plan his manufacturing techniques to get an end product that will be representative of the base resin in all important properties.

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Polyethylene has had 19 years of utilization in wire and cable applications. During this period widespread acceptance has been found for this material as cable insulation. For use, polyethylene must have toughness, flexibility and dielectric strength associated with excellent electrical characteristics. These properties and many others

The author has spent 14 years in product development and compounding in the electric wire and cable manufacturing field, having served with the Crescent Company, the Signal Corps, Anaconda Wire and Cable Company, the Rubber Latex Corp. of America and for the last 8 years in his present capacity with Royal Electric Company.

He delivered this paper on December 4, 1957, at the 6th Annual Wire and Cable Symposium of the Signal Corps at Asbury Park, N. J.

are affected to different degrees by variations in physical structure that occur in the processing of this polymer.

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Ethylene by addition polymerization (C_2H_4) combines with itself to develop long chain molecules. A given long chain molecule may be linear or it may contain various amounts of branching. Linear P.E. which has substantially no branches has the highest density. In this paper I shall refer to branched P. E. manufactured by the high pressure system showing low crystallinity of approximately 52% by viscosity measurements.

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The conditions necessary for polymerization require pressures of 15,000 to 30,000 psi and temperatures of 215°F to 575°F. In low density P. E. side branches (typically four carbon atoms long) are attached about every 30 methylene units. The number of side branches has a direct effect on the degree of crystallinity. The side branches act to prevent the long chain molecules from arranging close together in a crystalline structure.

The properties which depend on density are really a function of the ratio of crystalline and noncrystalline (or amorphous) content. In an elementary sense P. E. can be considered as a mixture of very tiny crystals embedded in a viscoelastic fluid. As might be expected, the crystalline regions offer an appreciable resistance to small deformations while the amorphous regions (the viscoelastic fluid) will deform and creep if the load is great enough. *(1)

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Usually in comparing the density of the base resin, the annealed density is referred to in comparison. Under these very carefully controlled conditions, a reproducible level of crystallinity is attained. Under normal conditions for wire and cable extrusion, the P. E. may not be fully annealed and consequently, a somewhat lower value of density is obtained. On aging, the resin continues to crystallize slowly. Higher values of such properties as stiffness, hardness, abrasion resistance and density result.

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P. E. *(2) as it is now manufactured at high pressure for wire and cable applications, has a melt index range @ 190°C ASTM D-1238 of 0.95-1.6, a specific gravity of 0.92 at 25/25°C and approx. 71 weight per cent crystallinity by X-ray diffraction that is listed later in this paper.

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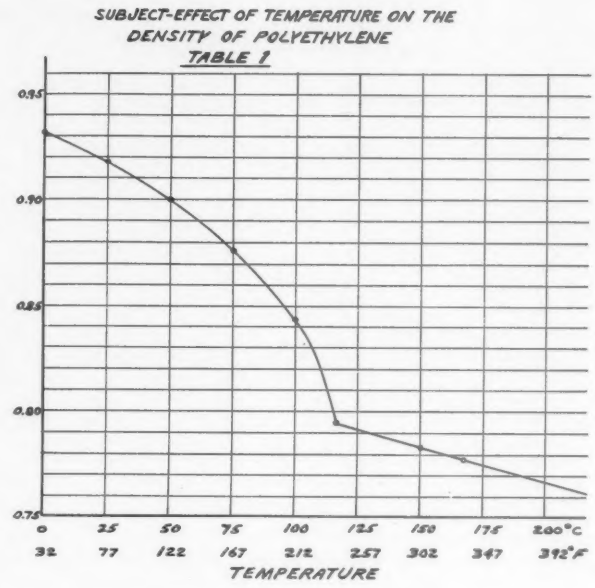
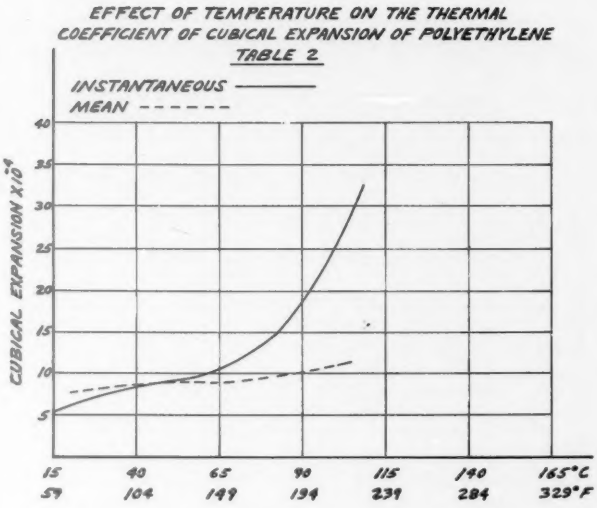
X-ray examination *(3) of un-





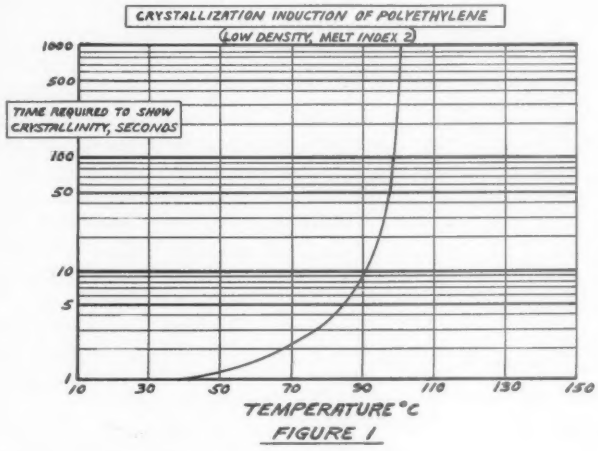
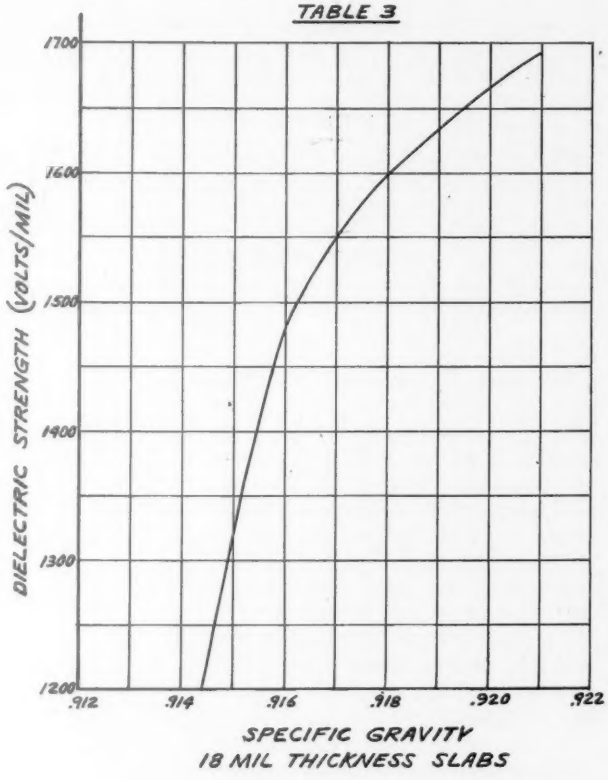


FIGURE 1



oriented P.E. below its melt point reveals a pattern of randomly distributed crystallites. These are arranged in small radial aggregates which are called spherulites. Extruded specimens of P.E. may also show orientation of the polymer chains.

★ ★ ★

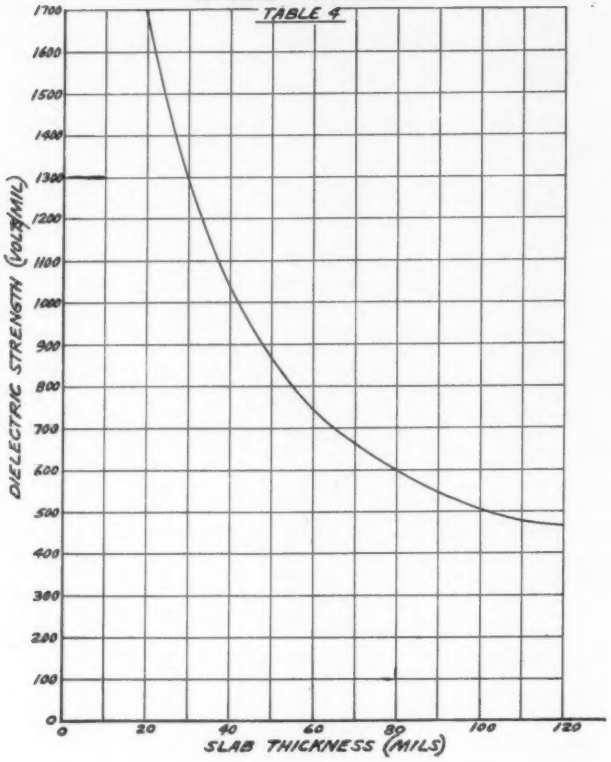
At a temperature of approx. 50°C (122°F) transition to an amorphous state becomes apparent. At 80°C (176°F) more pronounced (Table 1) and complete at 115°C (239°F). Above this temperature P. E. exists as a viscous liquid. If the polymer is cooled slowly from above this transition point, crystallization in relatively large spherulites will result. However, if the specimen is cooled rapidly in ice water, the size of the spherulites formed will be small.

★ ★ ★

As the insulated wire proceeds from the extrusion head in an amorphous condition above 121°C in temperature it is transparent. At this stage the density of P. E. is at a low point (Table 1). As it starts to cool, crystallization begins *(4). This is extremely rapid and the time for crystallization is very short (Figure 1). Because of a high coefficient of volumetric expansion (Table 2) over the useful operating range for wire insulation extrusion the return of the P. E. to room temperature is complicated by shrinkage which if not properly controlled may entrap voids. In addition the temperature of the metal conductor must be considered. The method and rate by which the insulation returns to its normal state of crystallinity or annealed state will determine the dielectric strength characteristics

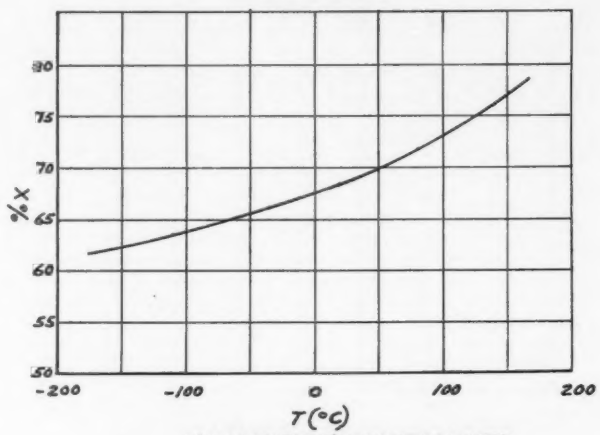
POLYETHYLENE DIELECTRIC STRENGTH VS. SLAB THICKNESS

TABLE 4



EFFECT OF QUENCHING ON CRYSTALLINITY OF DYNK POLYETHYLENE

TABLE 5



%X: WEIGHT % CRYSTALLINITY
T: TEMPERATURE OF QUENCHING BATH

of the cable.

★ ★ ★

In order to demonstrate this state of conditions platen samples of P. E. resin were prepared by normal press methods to procure uniform slabs free of air between two sheets of clean aluminum. These were heated in an oven at 115°C for 10 minutes to bring the material to an amorphous condition. Following this the slabs were air cooled, plunged into tap water at 21°C, boiling water and methanol dry ice bath at -54°C.

★ ★ ★

These conditioned slabs showed a marked difference in light transmission characteristics, specific gravity and dielectric strength.

★ ★ ★

Additional data is presented by **J. A. Snyder, Bakelite Company.** This may be entitled "Effect of Cooling Rate on Crystallinity of Polyethylene." The relationship between per cent crystallinity and quenching temperature for DYNK polyethylene resin has been plotted as shown in Table 5. This shows % Crystallinity vs. Quenching Temperature.

★ ★ ★

The data was obtained by X-ray diffraction as described by Bryant, Tordella and Pierce at the 118th National ACS Meeting held in Chicago on Sept. 3-8, 1950.

★ ★ ★

It was concluded from this data that:

1. **Quenching, or shock-cooling, polyethylene decreases its crystallinity.**
2. **The extent of crystallinity decrease varies as the severity of quenching.**

★ ★ ★

The specimens were prepared by repressing 127 mil preforms of DYNK down to 35 mils at 140°C. When the desired thickness (35 mils) was attained, the specimen was removed and immediately plunged into the quenching bath. Not more than one second elapsed during the transfer of the specimen from hot mold to cold quench bath. Three different quenching temperatures were used, namely, 0°C (ice water), -80°C (dry ice/acetone), and -170°C (liquid nitrogen).

★ ★ ★

P. E. *(5) resin shows a high degree of transmission in the visible range of the spectrum. At 25.4 microns (.001") P. E. films are highly transparent in the visible range of the spectrum. The crystalline structure of P. E. imparts a haze which reduces the total transmission as film thickness increases. The light transmission characteristics show a marked change with method of cooling of the P. E. sheets.

★ ★ ★

The conditioned slabs were checked for density using a Jolie balance and isopropyl alcohol. This was followed with a short time dielectric strength test on samples averaging 18 mils in thickness.

★ ★ ★

Table 3 shows the result of these measurements. Dielectric strength of P. E. is directly related to density. If we look at Table 4 *(6) the variations of dielectric strength vs. slab thickness are shown. By superimposing Table 3 and 4 it can be readily seen that improperly annealed P. E. can give dielectric strength characteristics that are very much out of line. For example, if a 50 mil insulation is selected which will average 860 volts/mil, a dielectric strength of 43,000 volts might be expected. However, de-

(*Please turn to page* 102)

The Extrusion of "Teflon" 100X Perfluorocarbon Resin—A New Melt-Extrudable Material For Wire Insulation

by R. E. Stabler
Polychemicals Department
E. I. du Pont de Nemours & Company
Wilmington, Delaware

This paper discloses the electrical and physical properties of this new resin. It also gives the extrusion conditions for processing "Teflon" 100X into various constructions including jacketing of cables.

The author delivered the paper at the 6th Annual Wire and Cable Symposium of the Signal Corps on December 6, 1957, in Asbury Park, N. J.

"Teflon" 100X perfluorocarbon resin is a new melt-extrudable material which has been offered recently for sale in developmental quantities by the Polychemicals Department of the du Pont Company.

★ ★ ★

The true thermoplastic behavior of "Teflon" 100X allows it to be processed rapidly and efficiently with conventional processing equipment. It has a melt viscosity at its processing temperatures in the same range as that of other thermoplastics which allows it to be processed as a melt.

★ ★ ★

"Teflon" 100X has an exceptional combination of properties which make it an ideal insulating material. It has excellent dielectric characteristics over a wide range of temperatures and frequencies. Its thermal properties are such that it is capable of continuous service at 200°C. Its mechanical properties are such that it is tough and strong over a wide range of temperatures from -200°C. to +225°C. Its chemical nature is such that it resists all chemicals and solvents up to 200°C. It has no known solvent and is affected only by alkali metals and certain complex halogenated compounds at elevated temperatures.

★ ★ ★

"Teflon" 100X has other properties which enhance its attractiveness as a wire insulation. These are: transparency, weather resistance including resistance to ozone attack, non-flammability, solder resistance, and essentially zero water absorption.

★ ★ ★

Fabricated "Teflon" 100X has been tested electrically over a temperature range of -40°C. to +250°C. and over a range of one to 60 megacycles, and has been found to have constant dielectric characteristics. The dielectric constant is 2.2 and the dissipation factor 0.0002 over these ranges. Its short-time dielectric strength on a 15 mil film is 1750 volts per mil. Its volume resistivity is high, being greater than 2×10^{18}. Its surface resistivity is greater than 2×10^{16} ohms, its surface arc resistance is greater than 165 seconds, and it does not form a carbon track.

★ ★ ★

"Teflon" 100X has a melting point of 285-295°C. (545 to 565°F.). Its brittleness temperature is -90°C. (-130°F.) Using a 32 mil wire hook, its cut-through temperature was 245°C. (472°F.) and using a 100 mil hook, 265°C. (509°F.). On heat aging at 210°C., 4,000 hours were passed without evidence of any degradation.

★ ★ ★

Mechanically, "Teflon" 100X shows appreciable retention of properties even at high temperature. At room temperature, it shows a tensile strength of over 3,000 psi, and even at 234°C. it still retains a tensile strength of 500 psi. At room temperature there is approximately 300 per cent elongation and at 234°C. it has at least 150 per cent elongation. Its abrasion resistance is also good, showing in Taber abrasion test (CS-17, 1000 gm load) a weight loss of 13 milligrams per thousand cycles. These properties of "Teflon" 100X make it an ideal insulating material for aircraft, electrical and industrial wiring. The use of "Teflon" 100X in thin walls permits space and weight savings of vital importance in the miniaturization plans of electronic designers.

★ ★ ★

We have processed "Teflon" 100X as a primary insulation in thicknesses from 5 to 15 mils onto wire sized from AWG 14 solid to AWG 30 stranded without difficulty. Rates of greater than 600 fpm have been successfully demonstrated on an AWG 22 wire. An advantage "Teflon" 100X shows in these applications as a primary insulation is that it can be extruded over tin-plated, aluminum-plated, silver-plated, or bare copper conductors without degradation of the conductors because of the short time at processing temperatures. "Teflon" 100X can also be easily pigmented.

★ ★ ★

We also expect usage of "Teflon" 100X in miniature coaxial cable cores and have successfully made 50, 75, and 95 ohm impedance coaxial cable cores. The latter has a 45 mil wall.

★ ★ ★

(*Please turn to page* 97)

Meetings Scheduled for 1958 By THE WIRE ASSOCIATION

These are your meetings, Mr. Wire Man, and you are cordially invited to attend and profit by them.

REGIONAL MEETING: Buffalo, N. Y., May 1 and 2 at the Statler Hotel.

Fred A. Webber, Chief Metallurgist, Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., is the General Chairman for this meeting.

The chairman of the Electric Wire and Cable Section of this meeting will be announced in February.

Plant inspection tours of the Wickwire Spencer Wire Mill for the Ferrous Division and to Western Electric Company's Wire and Cable Plant, to the north of Buffalo, have been arranged.

REGIONAL MEETING: Los Angeles, Calif., June 5 and 6, at Statler Hotel.

The program includes plant inspection tours and technical sessions, details to be announced later.

Joseph F. Conlan, President of the City Iron and Wire Works, Los Angeles, is the General Chairman for this meeting.

ANNUAL CONVENTION: Atlantic City, N. J., October 13-16, at Hotel Haddon Hall.

General Program Chairman will be Raymond S. Worth, Manufacturing Manager, Wire Mills Division, John A. Roebling's Sons Corp., Trenton, N. J. Chairmen of the Program Committees for the Convention will be;

Ferrous Division: Dartrey Lewis, Chief Engineer, Research and Development, John A. Roebling's Sons Corp., Trenton, N. J.

Non-Ferrous Division: Hugo W. Biskeborn, Director of Manufacturing, Ansonia Wire & Cable Co., Ashton, R. I.

Electric Wire & Cable Section: To be announced by Mr. Biskeborn in February.

Plant visits to Roebling's Wire Mills and Electric Wire and Cable plants will be made.

Papers delivered at these meetings will be prepared and presented principally by production men in the mills.

You are cordially invited to attend any or all of these meetings. You can broaden your contacts and exchange ideas on your own problems through personal meetings with others—as well as secure valuable information from the technical papers and the discussions that follow them.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 MAIN STREET **STAMFORD, CONNECTICUT**

Electric Wire and Cable Section Formed by

THE WIRE ASSOCIATION

This section of the Association, authorized by the Board of Directors in 1956, is now set up to provide a full program of technical papers for production men of the Electric Wire and Cable Industry, and a committee has been formed of leaders in this field to direct this work.

Mr. Brown will serve as Secretary of the Committee. All correspondence relating to papers, membership, etc., which will be with requests for information, will be turned over to the proper sub-committees upon receipt. Suggestions for technical papers that members would be willing to present will be welcomed.

The first meeting in 1958 will be held at the Statler Hotel in Buffalo, N. Y., on May 1 and 2. This Regional Meeting will have a program of especial interest to electric wire and cable production men and will include a plant inspection tour.

The Association now includes in its membership representatives from 70% of the insulated wire and cable producers in the U.S.A., Canada and Mexico and, in addition, has representatives from the major producers in 22 foreign countries. Efforts are now under way to increase the Association's coverage of the industry.

About 10 years ago the Non-Ferrous Division of the Association was organized to cover both bare and insulated wire. In this new development, the Electric Wire and Cable Section will now have its own separate and full programs for production personnel, in which all production men, including engineers, chemists and others concerned with the manufacture of electric wire and cable, will find personal contacts and technical information especially geared to their interests and problems.

If you are not now a member, please write for a booklet and a membership application

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 Main Street **Stamford, Conn.**

NEMA's Wire and Cable Section Holds Annual Meeting in Atlantic City

B. F. Ilsley, general manager, Wire and Cable Department, **General Electric Co.,** was re-elected chairman of the Wire and Cable Section of the **National Electrical Manufacturers Association** at its recent 3-day annual meeting in Atlantic City, N. J.

★ ★ ★

The Section also re-elected its two vice chairmen—**David E. Allen,** vice president—sales, **Anaconda Wire and Cable Co.,** and **H. B. Bassett,** president, **The Acme Wire Co.**

★ ★ ★

In addition the following were elected to the Advisory Committee, the executive group of the Section: **R. C. Bennett, Jr.,** General Vice President, **National Electric Products Corp.; H. T. Brinton,** President, **Phelps Dodge Copper Products Corp.; H. W. Clough,** Vice President, **Belden Manufacturing Co.; A. D. R. Fraser,** President, **Rome Cable Corp.; V. W. Heimberger,** Manager of Electrical Products Sales, **American Steel and Wire Div.,** U.S. Steel Corp.; **C. W. Higbee,** Assistant General Manager, Electrical Conductor Div., **Kaiser Aluminum and Chemical Sales, Inc.; J. R. MacDonald,** Chairman of the Board and President, General Cable Corporation; **A. F. Metz,** Chairman of the Board, **The Okonite Co.; Everett Morss,** President and Treasurer, **Simplex Wire and Cable Co.; Samuel A. Rea,** Chairman and Treasurer, **Rea Magnet Wire Co., Inc.; A. F. Sheldon,** President, **Kennecott Wire and Cable Co.; William E. Sprackling,** President, **Anaconda Wire and Cable Co.; S. E. Yeaton,** General Product Manager, Electrical Wire Div., **John A. Roebling's Sons Corp.**

★ ★ ★

The Section also considered the formation of an aircraft wire group to work on standards problems involved in this particular product, but deferred a decision on the matter until next year.

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Members were informed of plans being made for the proposed production of wire and cable technical handbooks. Under this proposal, NEMA would issue technical data on individual wire and cable products which would be based on industry standards. This information would replace similar technical data now included in individual company catalogs.

Copper Problems

Among the highlights of the program was a discussion of the copper problem by **Dr. Joseph Zimmerman,** editor-in-chief of the **Daily Metal Reporter.** In his address, Dr. Zimmerman told his listeners that "there is nothing wrong with the copper market that a cut in production would not cure."

★ ★ ★

Copper prices, he said, have had a dizzy sinking spell that is unprecedented in the history of the industry, brought about partly from abnormally high prices that prevailed in 1955, and during the early part of 1956.

★ ★ ★

"These high prices, coupled with the incentive contracts that our Government offered to domestic and foreign mining companies to open mines and to increase the output at old ones, stimulated production to a point where it is running in excess of demand.

★ ★ ★

"The end-users of copper have been drawing heavily on their inventory so that their actual consumption is much larger than their purchases would seem to indicate. These inventories are now at a low point and are not being replenished because consumers, knowing that producers are carrying large stocks of unsold copper, feel safe in buying from hand to mouth.

"If the large copper producers were to curtail their output, it would have a profound effect on consumers' buying policy.

★ ★ ★

"As to whether the copper market has turned the corner, in view of the fact that in the past 16 months the price has dropped more than 50 per cent, from 55 cents a pound to about 26 cents a pound, the market is nearer the corner now than it has been. An adjustment in the supply position is all that is needed to push it definitely around the corner."

Survey Discussed

In other key talks, the following pertinent points were made: **K. C. Crain, National Electric Products Corp.,** and Chairman of the Section's new Packaging Committee, discussed a recent NEMA survey of types and sizes of reels being utilized in the industry. The survey, he said, revealed that the industry is using a tremendous number of types and sizes of reels, and that substantial economies could probably be realized if some type of standards program could be instituted.

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Robert Merrill, retiring Director of Copper Division, Business and Defense Services Administration, and manager, Materials, Wire and Cable Department, **General Electric Co.,** said it is good business for both the Government and industry to see that the flow of information between the two groups is directed by men who have a sound and thorough knowledge of industrial operations and activities.

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"A major activity of BDSA is concerned with preparing basic and special industry studies and reports. They involve a detailed analysis of the material requirements and principal component

(*Please turn to page* 95)

The Development of Modern Thread Rolling

by Joseph H. Cacella, Project Engineer
Hartford Special Machinery Company
Hartford, Connecticut

It is a far cry from the first concept of the idea of a screw to modern high-speed thread rolling. In this article the author traces the history of thread rolling and describes today's processes, comparing cut threads with rolled.

With the discovery of the screw thread principle by Archimedes in the third Century B. C., another milestone in man's quest for better living became a reality and incidentally one of the six mechanical powers.

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While the ancient Romans were familiar with the principle of the screw, it was not until the sixteenth Century A.D. that the first working screw machine was built by a French Engineer. Far from being a high production machine, it was nevertheless the forerunner of things to come. This machine, a wooden-frame structure, utilized a foot treadle and several weights which rotated the stock slowly. The thread was scratched in initially by a flat plate with several sharpened points. When the plate reached the end of its travel, it was reversed and repeatedly run back and forth until the grooves cut by the sharpened points were to the correct depth. Because the master screw used on the first machine was not accurate, the finished screw had to be hand-filed where accuracy was required. Interchangeability as a word was unknown and the idea unthought of.

★ ★ ★

We must realize that the earlier engineers and machine tool builders most certainly had the same amount of curiosity and powers of observation that we have in this generation. Because we can call upon this accumulated knowledge that preceded our generation, the solution of the problems confronting us today are lessened.

★ ★ ★

With the building of a screw machine entirely of iron and perfecting the master screw early in the nineteenth century the fastener industry began making threaded parts with some semblance of accuracy. Since there were no standards for the various thread parts, this resulted in each manufacturer making their threaded parts to their own specifications with the end result that no two makers parts would interchange with one another.

★ ★ ★

Sir Joseph Whitworth is credited with pioneering the idea of a single standard for the fastener industry —this was readily accepted throughout England. On the other hand the United States lagged behind on their standardization. It was not until the middle of the nineteenth century that the expanding industries, growing at an unequalled rate, began to develop pressure for standardization.

★ ★ ★

Today, even routine screws turned out at rates of thousands per hour, are accurate to thousandths of an inch. These screws of the same size made by a manufacturer in one portion of the United States are interchangeable with other manufacturers screws from another section.

★ ★ ★

Thread Rolling as a process, contrary to public belief, has been in existence since the late nineteenth century, although it was not used for regular production until the early twentieth century. In the early days of thread rolling the process was slow to take hold; in fact, a rolled screw was looked upon as an inferior product and only used for the crudest applications. This was due in a large part to the fact that no accurate method of manufacturing the dies was available at that time, plus the fact that the steel used for the blanks would fracture during rolling.

★ ★ ★

These early drawbacks were overcome with new steels, accurate dies, and thread rolling machines built with greater rigidity. During World War II the aircraft industry recognized the process and specified rolling for producing threads of class four and five.

★ ★ ★

The principle of thread rolling is similar to the cold forging process in that metal is neither removed nor wasted. Using a set of dies with the correct pitch, lead and tooth form, the blank, a cylinder with an outside diameter of approximately the pitch diameter is rotated between the dies. A set of dies used on a reciprocating type of machine consists of a moving die and a stationary die. As the moving die advances, the blank is wedged between the two dies. The die threads penetrate the blank surface to form the roots and displaces the material outward to form the crests.

★ ★ ★

One of the most frequent and economical methods of producing fasteners is by the thread rolling process. Thread rolling machines are available for manual loading or arranged with semiautomatic or automatic feeding devices. Fully automatic machines can be operated in batteries with several machines to each operator. See Figures 1, 2 and 3. Although it is conceded that thread rolling has proved economical in large quantity production, similar savings can be realized on small lot production.

Material Savings

Thread rolling does not remove or compress material. Therefore,

Fig. 1—Hartford Special Model A-190-H Manual Thread Roller. This model is equipped to run normally at speeds of from 45-60 strokes per minute.

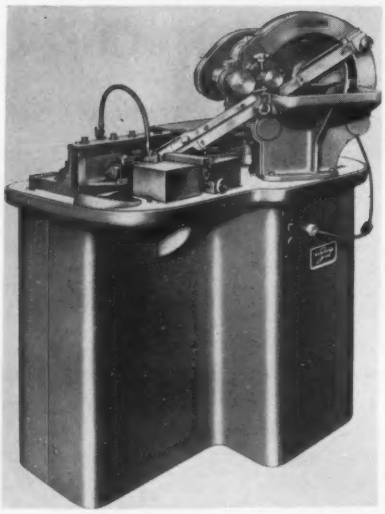


Fig. 2—Hartford Special Model A-190-R Automatic Thread Roller. This machine is capable of producing pieces at a rate of from 230 to 250 pieces per minute.

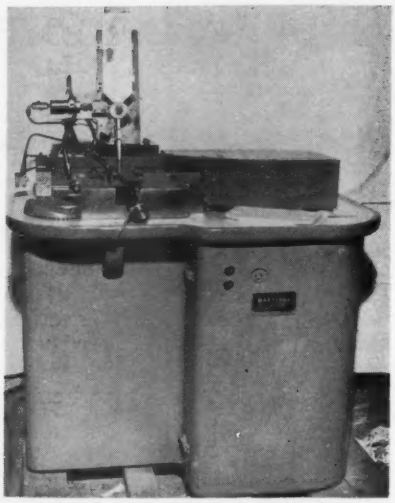


Fig. 3—Hartford Special Model A-190-M with special magazine Feed.

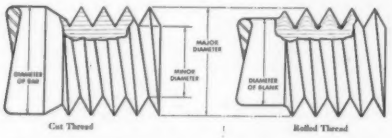
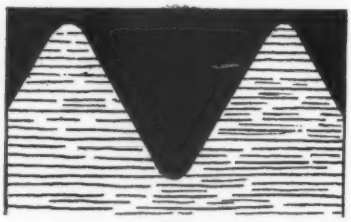
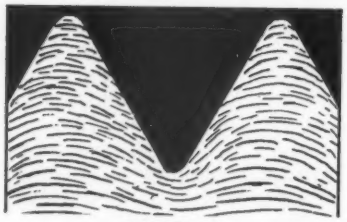


Fig. 4—A comparison of a cut and rolled thread. Unlike other threading processes, no material is removed and consequently no chips are produced



Cut Thread



Rolled Thread

Fig. 5

COMPARISON OF COMMON THREAD FINISHES

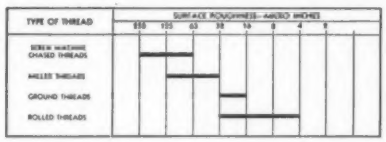


Fig. 6

the blank cannot contain more than the correct amount of material necessary to form the finished thread. When blanks are prepared by heading or extruding, material will be saved. The blank is made smaller than the finished thread, and material that is pressed out of the roots of the thread is rolled outward to form the crests. No chips are produced in the rolling process. This method results in material savings ranging from 16% to over 27%. See Figure 4.

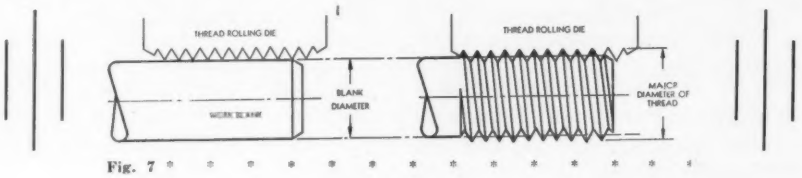


Fig. 7

Mechanical Properties of Rolled Threads

Tests on rolled threads have reportedly shown an increase of 10% in ultimate strength in tension, fatigue and shear resistance. In the rolling process the fibers are not severed as in other methods of producing threads. Instead they are reformed in continuous unbroken lines. See Figure 5. Using smoothly finished blanks and ground and polished dies, will produce threads with surface smoothness greater than the dies. This is accounted for by the slight burnishing action due to the slippage that the threads receive as they roll between the dies. See Figure 6. A comparison of thread finishes commonly produced by the various threading methods is shown in the accompaning table.

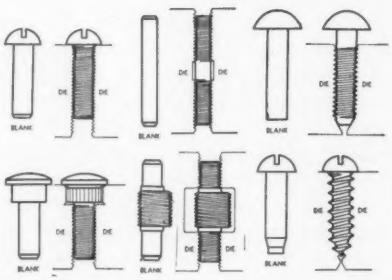


Fig. 8—Typical Rolling Applications. Top row, left to right: Machine Screw; Stud; Thread and Chamfered End. Bottom row, left to right: Threading and Knurling; Threading Both Ends of Part with Eccentric Body; Threading Gimlet Point Screws.

Economy with Thread Rolling

Because thread rolling dies do not require sharpening, uniformity of rolled threads require the minimum of inspection time. The thread form of a set of dies is accurately reproduced on the parts and does not change to any great extent during the entire life of the dies. Wear is distributed over a

(*Please turn to page* 113)

Government Wire Production Information

Booklet on Government Services

A summary of activities, services and publications of the Federal Government which are useful to business in distribution research has just been published by the U. S. Department of Commerce.

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The 60-page booklet was prepared as a supplement to a discussion of this subject presented at the President's Conference on Technical and Distribution Research for the Benefit of Small Business, recently held in Washington.

★ ★ ★

Entitled "Activities and Services of the Federal Government in Distribution Research," the booklet describes three types of distribution research programs carried out by many Federal Government agencies. Part I covers major periodic statistical programs; Part II, broad economic analyses and industry studies; Part III, operations of the firm, and markets.

★ ★ ★

In addition, Part IV covers dissemination of marketing information through publications, and Part V special studies, tabulations, and other types of direct assistance to private firms and communities in the solution of marketing problems.

★ ★ ★

A bibliography of Federal government regularly-programmed statistical publications useful in distribution is given in Appendix A. Appendix B lists specialized aids issued by the Federal Government useful to business men for keeping current or using statistical data. Addresses of the field offices of the U. S. Department of Commerce and of the Small Business Administration are shown.

★ ★ ★

Harry W. Ketchum, Director, Office of Distribution, Business and Defense Services Administration, U. S. Department of Commerce, led the discussion of the subject at the President's Conference and this summary was prepared as a supplement to this talk. Facts for the summary were collected in a survey by the Conference Committee on Distribution Research and from other sources.

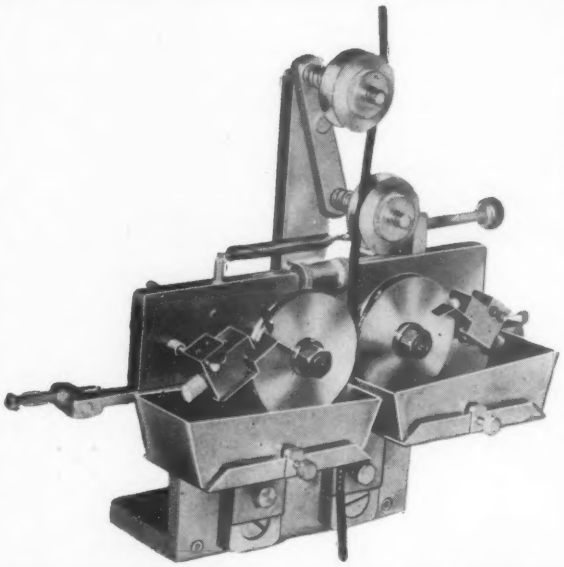
★ ★ ★

Copies may be purchased for 40 cents each from the Government Printing Office and through U. S. Department of Commerce field offices.

New Optical Testing Device

Albert Hoffman & Co., 629 59th St., West New York, N. J., has announced the availability of a new

MARKING WHEELS and MACHINES for ELECTRIC WIRE



Gillies Engraved Concave and flat marking wheels are widely used printing the I.P.C.E.A. color code, numerical, semi-spiral, stripped, dating, or manufacturer's identification, etc. on insulated wire, tubing or hose.

Machines print on ONE or BOTH SIDES in large legible letters. Wheels are adaptable to any machine—or we will supply the machines.

Wheels, shafts, ink pans and all accessories are readily removable for quick and easy cleaning.

Wheels are made of TOOL STEEL, HARDENED to Rockwell test 61-64 and HARD CHROME PLATED.

Send for samples of wire and prices on wheels and equipment.

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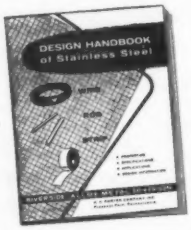

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RIVERSIDE-ALLOY METAL DIVISION

optical testing instrument, called the "Projectina."

* * *

The Projectina is completely new in design, with elements that differ from those of previous manufacture, making it more versatile and accurate than other instruments. It has many uses in the wire industry in testing, product development and research.

* * *

Full information on this "most useful" instrument will be supplied upon request to the company.

Chase Sells Cold Heading Department

Announcement by **Chase Brass & Copper Co.** of the sale of the entire Cold Heading Department of the Waterbury Mfg. Co. Division to the **Connecticut Screw & Rivet Company,** Waterbury, Conn., and its affiliate company, **Anchor Fastener, Inc.,** has been made by **Glenn P. Bakken,** president of Chase.

* * *

The purchase includes all facilities, such as dies, tools, prints and other information necessary to the production of cold headed products formerly made by the Chase division. This line included automotive, electrical, builders hardware, electrical appliance and special cold headed products.

* * *

John A. Largay, president of Connecticut Screw & Rivet and Anchor Fastener, said that his companies are major suppliers to the automotive and electrical industries, making complete lines of machine screws, Sems, tapping screws, special clips, nuts, washers, etc.

* * *

Mr. Bakken emphasized that the closing of the Waterbury Mfg. Co. Division applies only to that division and that the operations at the Chase Metal Works and the Chase Cleveland mills will continue in both locations.

Reinforcement Wire Outlook

by Frank B. Brown
Managing Director
Wire Reinforcement Institute
Washington, D. C.

Producers of welded wire fabric approach the year 1958 with manufacturing facilities capable of meeting the construction requirements of an expanding economy. Forward looking planning over the past three years has increased the steel fabric producers' capacity almost one hundred percent.

★ ★ ★

Anticipating the construction market of 1956 and the needs of the expanded highway program, this industry geared itself for the requirements of reinforced concrete construction. Expansion began early in 1955 and has continued through 1957.

★ ★ ★

Following the usual pattern, demand for fabric this year has paralleled construction volume. With the road program still in initial stages, housing activity reduced over 1956 and commercial and industrial building off, reinforcing fabric shipments are lower than in 1956.

★ ★ ★

Other factors contributing to a decline are decreased activity in reinforced concrete pipe, forerunner to highway and land development and the over-all financing picture.

★ ★ ★

As for 1958, shipments should be equal to or perhaps slightly better than in 1957, with any gain coming in the last half of the year. The highway program should be progressing at a faster tempo by then and will represent the principal potential gain. Reinforced concrete pipe for sewage and water works projects, as well as for highways, should show a gain. Housing starts will probably equal 1957.

★ ★ ★

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Due to the ever-increasing demand for our spools and reels, we've had to make our second move in just two years! And in our new and spacious quarters we are manufacturing plywood. Since it's made especially for spools and reels, even better-grade products will result—CARRIS spools and reels, now QUALITY-CONTROLLED from plywood to finished spools and reels!
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Next, make it a point to get all the facts you need to specify the right reels, spools or bobbins to meet your individual requirements. Given the opportunity, Apco Mossberg Engineers can custom design units to meet your exact specifications in size, shape, balance and trueness . . . many times at a substantial saving over the units you are now using.

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APCO MOSSBERG COMPANY
Lamb Street, Attleboro, Mass.

turers and producers of welded wire fabric. Its members represent over 95 percent of this country's productive capacity.

ABSTRACTS

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 2 Charterhouse Street, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

CRYSTALLOGRAPHY OF COLD DRAWN MUSIC WIRE
H. C. Burnett, C. J. Newton. Wire & Wire Prod 1955 Vol 30 p 1375 (Nov); Techn News Bull 1957 Vol 41 (8) pp 118-119 (Aug)

For investigation with a diffractometer, several short lengths of wire were cemented together and mounted in bakelite. The surface of each specimen was cut at a specific angle with respect to the wire axes, metallographically polished, etched and given a final polish. The results showed that the preferred orientation increased with increased reduction of area by drawing to a diameter of 0.047 in. Further drawing showed a sharp decrease in the degree of preferred orientation. 3 illustr, 1 table.

WIRE DRAWING MACHINERY
E. Daugherty (Vaughn Machinery Co). Wire & Wire Prod 1957 Vol 32 (8) pp 886-888, 942-943 (Aug)

Following a general historical account of the development of wire drawing machines, a number of modern multi-hole machines are considered in detail.

FREE-FLOATING GRINDERS PUT SMOOTH SURFACE ON WIRE
Johnston & Funk Titanium Corp, Wooster, Ohio. Iron Age 1957 Vol 179 (6) p 114 (Feb 7)

The production of titanium welding wire was complicated by the embrittling effect of air contaminants on the rod. A special machine has been built which employs 6 free-floating grinding wheels, about 10 in. in diameter, each of which covers 60° of the rod's circumference. The wheels align parallel to the rod in order to keep abrasion marks longitudinal. The machine grinds 0.020 in. from the surface of the rod leaving seamproof stock in most cases. The process successfully removes contaminants and produces highly ductile, ultra-smooth surfaced material.

RADIO VALVES
Mullard Blackburn Works. Wiggin Nickel Alloys 1957 (45) pp 3-8

There is reference to the drawing of nickel tubing from 7 mm outer diameter to 6 mm bore to 0.750 mm outer diameter by 0.650 mm bore, using tungsten carbide dies and mandrels of hard steel wire. The drawing of very fine tungsten wire is also discussed, but no details are given. 14 illustr.

SPK DRAWING DIES. SPK-Ziehkonen Anon. Draht 1957 Vol 8 (8) p 363 (Aug) (In German)

This new material is a sinter product of very fine aluminium oxide crystals. Its great hardness (DPH = 1,900 to 2,000 kg/sq mm) is not associated with ex-

cessive brittleness. High wear resistance makes it suitable for wire drawing dies for very fine copper, aluminium or steel wires, and 8 or more stages can be sintered in one piece. The metal sleeves usual with ceramic dies are unnecessary and the SPK dies can be made to the same external dimensions as steel dies. The diameter is precision ground with diamond wheels and pastes. This is a skilled operation which should only be carried out by the manufacturer. The cost of regrinding and polishing is relatively low, so that it is economical to produce the dies in one unit, thus ensuring that the ratio between the stages remains constant. 2 illustr.

THE DRIVE AND CONTROL OF MULTIPLE STRAIGHT-LINE WIRE DRAWING MACHINES
F. Liekmeier. Draht 1957 Vol 8 (8) pp 282-285 (Aug) (In German) 6 illustr.

CARBIDE CUTS EXTRUSION COSTS
Mueller Brass Co., Port Huron, Mich. Steel 1957 Vol 140 (8) pp 112-113 (Feb 25)
Chrome-carbide dies are used to produce 0.44 in. rod from 8 in. billets in one push. The new dies outlast by 5 to 1 the steel ones which they replaced. Tolerances are easier to hold and imperfections reduced. 7 illustr.

COPPER WIRE HAS STEEL CORE
National Standard Co., Niles, Mich. Steel 1957 Vol 140 (3) p 90 (Jan 21)
A new copper-clad steel wire is reported to possess good conductivity, bright finish and high resistance to fatigue and corrosion. Uniformity of the coating thickness is held within 1% of wire diameter. The bond is produced by electroplating and the high finish by precision drawing. 1 illustr.

New Resistance Alloy

A new iron-chromium-aluminum alloy for use on moderately high temperature resistance heating applications such as small appliances —toasters, hot plates, etc.—and on industrial heating devices where continuous operating temperatures do not exceed 2150 degrees F., is announced by **Hoskins Mfg. Co.**, Detroit, Mich.

★ ★ ★

Known as Alloy 815, the new development is offered as an addition to the company's long-established nickel-chromium resistance alloys for areas where the application requirements can be met by the new alloy—which is free of all critical raw materials—and where cost is a factor. Important properties of Alloy 815 include high resistivity (815 ohms per circular mil foot at 68 degrees F.), low specific gravity, and exceptionally high resistance to oxidation.

★ ★ ★

Other uses for the new alloy in-

For Moisture Resistance, Specify

TEXTILENE

TWI-FLEX and TWI-WAX

Treated to reduce wicking and prevent leaching, lightly waxed Textilene Twi-Flex and heavily waxed Textilene Twi-Wax provide effective resistance to moisture. Both fillers are extensively employed for non-metallic sheathed cable (building wire), maritime shipboard cable, varnished cambric cable, and underground service entrance cable.

Twitchell's superior Textilene line also includes: Soft, dry fillers — *Twi-Port* and *Glascor** (Fiberglas-centered for high tensile strength without added bulk). Used for control, power, appliance, coaxial and communications cables, and all portable and flexible cords. Fungus-resistant filler — *Twi-Tar*. Used for buried communications cable, expanded ACSR cable, and in other applications.

*Patent Applied For

For Every Wire and Cable Application
Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation—also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

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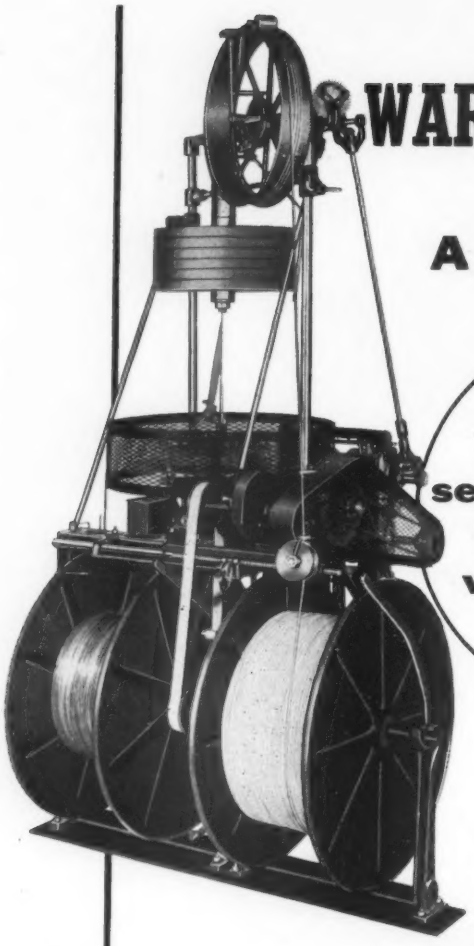
Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven



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New improved serving machine for applying various types of tapes

- Equipped with adjustable traverse, supply and windup stands, windup driving mechanism, electric stop-motion and capstan release mechanism.
- Adjustable for regulating lay of material.
- Rate of production dependent upon width of material and lay.
- Driving pulley 8″ diameter; 1 3/4″ belt.
- Capstan 18″ diameter, 3″ face.
- Opening through serving head 5/8″ diameter.
- Supply packages 16″ diameter, 3″ diameter core.
- Supply tube holds 8 reserve packages of 1″ wide material.
- Maximum power requirement 3/4 H.P.
- Motor drive furnished upon request at additional cost.
- Counter for measuring production in feet.
- Stands accommodate reels 30″ in diameter, with overall width up to 16 inches.
- Base plate supplied for bolting frame to floor to prevent vibration in machine.
- Reels not included with machine.

Note: Serving head normally runs clockwise, but can be made to run counter-clockwise if desired.

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clude certain "cold" resistor applications such as defroster units, contact switches and rheostats. In addition, the greater ductility of Alloy 815 compared to other iron-chromium-aluminum alloys makes it suitable for heavy relay switches and other equipment where considerable cold forming is required.

New Association Progress Report

The need for improving the flow of information on existing and new electrical insulating materials was considered desirable by many attending the two-day meeting in New York City, December 10 and 11.

★ ★ ★

Called by the working group of the proposed **Electrical Insulating Materials Association,** it was attended by representatives of technical societies, trade associations and the working group on December 10. On December 11, a meeting comprised principally of representatives of manufacturers of electrical insulating materials was held at the Barbizon-Plaza Hotel.

★ ★ ★

All present agreed that end-users of electrical insulating materials might well be provided with more and better information on insulation than is now available, but as to the means of accomplishing this, there was divided opinion, many feeling that existing societies could be used to better advantage.

★ ★ ★

At the conclusion of the meeting, a majority voted that the working group should be kept alive until March 31, 1958, to give it an opportunity to reappraise the situation in the light of the discussions, particularly with reference to utilization of existing organizations to accomplish the aims the proponents of EIMA had in mind. One society, AIEE, pointed out that it had current plans that would embrace practically all of the EIMA objectives.

Get the habit of reading regularly
WIRE AND WIRE PRODUCTS
The Wire Man's Magazine

Outstanding Personalities of the Wire Industry

Association Clock Wound for the Coming Year

The handsome 400-day grandfathers clock presented to **The Wire Association** in 1948 was officially wound on November 12, 1957, by **Peter D. Gill,** Director of **The Spencer Wire Co. Ltd.** of Wakefield, England. Mr. Gill is the son of **Charles D. Gill,** Chairman of Directors, who wound the clock in 1954.

★ ★ ★

Originally presented by **John Rigby** on behalf of the Association's British members in appreciation of the many services rendered to them by the Association, the clock graces the society's headquarters in Stamford, Conn., and is traditionally wound each year by a British member, whose name, following the ceremony, is inscribed on a parchment scroll that is displayed at the side of the clock.

★ ★ ★

Mr. Gill attended our Annual Convention in Chicago and has been visiting various American wire mills during his stay in this country, which terminated when he embarked for home on November 29th. We are grateful to him for performing this function so graciously and trust that his visit to our shores has proven both instructive and enjoyable.

Peter D. Gill

Names Sales Engineering Director

Jerome I. Cohn has been named director of sales engineering for **Inso Products, Ltd.,** newly-formed subsidiary of Adam Consolidated Industries, by **Harold N. Leitman,** president and chairman of the board of the parent company.

★ ★ ★

Mr. Cohn formerly was manager of manufacturing for Electronic Wiring Corp., Flushing, N. Y., and senior planning engineer for the Electronics Office Shore Division of the New York Naval Shipyard.

GLADER

HIGH SPEED WIRE NAIL MACHINES

HIGH TONNAGE OUTPUT—LOW MAINTENANCE COST

You can take care of increased production schedules and better product demands with these machines of established reputation.

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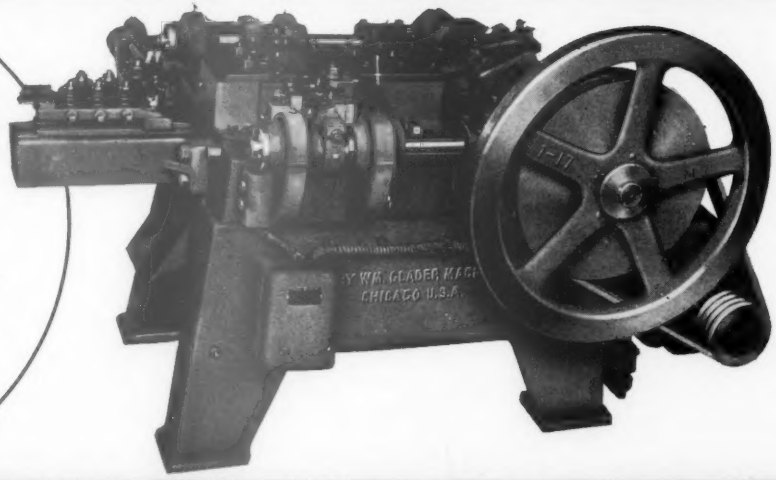

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NEW MPS CONVOLUTE DURA CURL RIMS...

The difference between just any spool or reel and Superior MPS CONVOLUTE DURA CURL Rims is well worth your close attention. Because now, with this exclusive MPS feature, maximum strength and rigidity are obtained throughout the reel heads. You can now have continuous trouble free high speed winding, without spool straightening expense. These new MPS spools also have the famous **No-Crev** feature.
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give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to **help you!**

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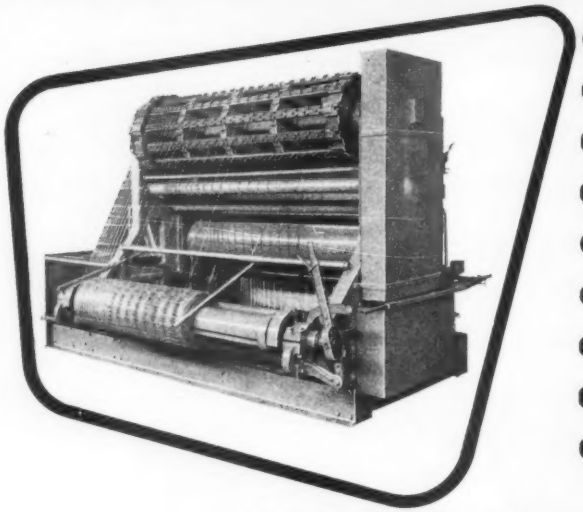

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- Replaceable Main Bearings
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Specialists In Fence Looms

In his new position, Mr. Cohn will coordinate all sales and engineering facilities and consult on high temperature wire and its applications with companies in this field.

★ ★ ★

Inso Products, Ltd. manufactures a wire made by a new, exclusive process which applies a thin film of Teflon insulation to copper wire and which could radically change the design of electrical components on airborne, electronic, appliance and other industries. The wire saves as much as 34 per cent in weight, 51 per cent in space and 40 per cent in cost over similar products.

Three Wire Men Moved up by Bethlehem Steel

Announcement has been made by **Bethlehem Steel Company** at Sparrows Point, Md., of the promotion of three men in the Rod and Wire Mills.

★ ★ ★

W. Roy Mackay has become Superintendent of the Rod and Wire Mills, replacing **Carl E. Johnson,** who has been given another assignment. Mr. Mackay graduated from M.I.T. in 1918 with a

Left to right: W. Roy Mackay, R. A. McCarthy & N. T. Nelson.

degree in electrical engineering. He taught physics at the Georgia Institute of Technology and then engaged for 3 years in engineering and development work. He joined Bethlehem in 1922, where he has worked in various engineering and managerial capacities up to this appointment. He had been Assistant Superintendent since 1937.

★ ★ ★

R. A. McCarthy, who has been at Sparrows Point since 1922, was promoted from General Foreman to Assistant Superintendent of the Rod and Wire Mills. **N. T. Nelson, Jr.,** who has been Special Engineer at the Point, at the same time also was appointed Assistant Superintendent in the same department.

Joins Sales Force at Chemical Products

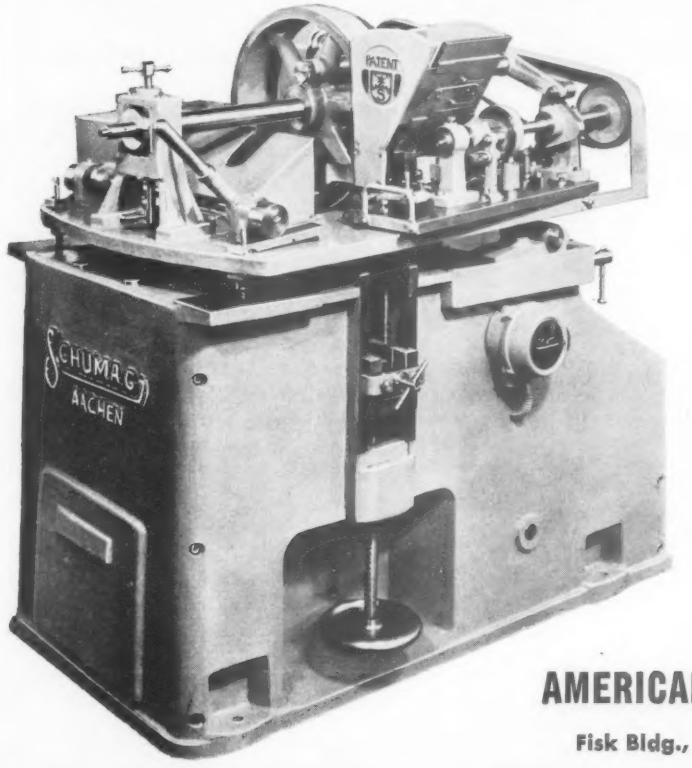
Chemical Products Corp., East Providence, R. I., announces the appointment of **Thomas D. McGuire** to its Chem-o-sol Sales Division. A graduate of the University of Michigan, he will represent the Corporation in upper New York State and surrounding territories.

★ ★ ★

Mr. McGuire was formerly with Auburn Button Works, Inc., and with ten years experience in the technical sales of vinyl dispersions, he is fully conversant with application methods and end uses for vinyl plastisols.

Rockbestos Sales Appointments

Warren S. Jones, Dallas district sales representative for the **Rock-**



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Automatic Pointing Machines

For Mass Production

Rates 6,000 - 70,000 pieces/hr.

These machines are designed for completely automatic, high volume pointing of needles and other small cylindrical parts. Length of points adjustable.

Five models:

Shaft lengths from 1½" to 18"
Diameters from .020" to .390"

Exclusive Representatives
for U.S.A., Canada and Mexico

AMERICAN LAUBSCHER CORPORATION

Fisk Bldg., 250 West 57th St., New York 19, N. Y.

bestos Products Corp., New Haven, manufacturers of insulated wires and cables, has been appointed assistant to Sales Manager **Richard H. Bamford**, effective January 1st, it was announced today by **H. O. Anderson**, vice president in charge of sales.

★ ★ ★

Mr. Jones opened Rockbestos' new Dallas sales office in April, 1957. He had represented the company for seven years in New Orleans. Prior to that he had been a representative for the company on the West Coast.

★ ★ ★

Mr. Jones is succeeded in Dallas by **William C. Crymes**, who had been with Chance Vought Aircraft as a components and standards analyst engineer.

Smith Made General Superintendent by Canada Wire

The appointment of **G. W. Smith** as General Superintendent, Toronto (Leaside) plant of **Canada Wire and Cable Company Limited** has been announced by **D. S. Grant** General Works Manager of the company.

G. W. Smith

Carpenter Steel Appoints Metallurgist

The Carpenter Steel Company, Reading, Pa., has appointed **Samuel E. Tyson** as Metallurgist, Stainless Steels, according to an announcement by **Dr. Carl B. Post**, Vice President.

★ ★ ★

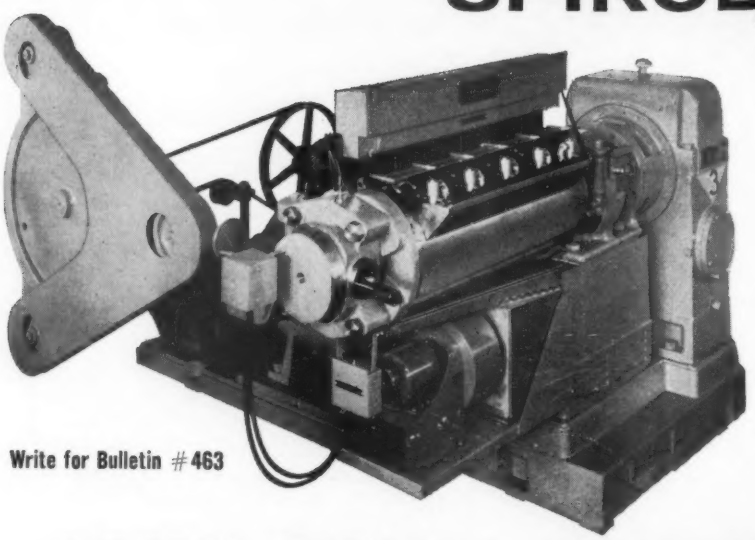
Mr. Tyson joined Carpenter as laboratory assistant on his graduation from Pennsylania State University in 1948. He was promoted to Assistant Metallurgist, Stainless Steels, in June 1955. He is a member of the American Society for Metals, National Association of Corrosion Engineers and The Wire Association.

Crucible Adds Man to Cincinnati Branch

Crucible Steel Company of America has announced the appointment of **Joseph W. Duba** as Assistant Manager of the Com-

ROYLE

SPIROD® for Rubber or Plastic Wire Insulating



Write for Bulletin #463

These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

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ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

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TOpaz 1-0371

Tokyo, Japan
Okura Trading Co., Ltd.
(56) 2130 - 2149

pany's Cincinnati Sales Branch.

★ ★ ★

He will assist Richard J. Rand, Branch Manager, in his responsibility for sale of Crucible's specialty steels to customers in southern Ohio, eastern Kentucky, and southern West Virginia.

Ernest W. Clark

Ernest W. Clark died on December 9, 1957, at his home in Plainfield, N. J., after an illness of three months duration.

★ ★ ★

Mr. Clark, a long-time member of the Wire Association and a former Director, was formerly a mechanical engineer in the Wire and Cable Section of **General Electric Company** at Schenectady.

★ ★ ★

He left General Electric in 1944 to become a Consulting Engineer for the Syncro Machine Company in Perth Amboy, N. J., a post he held until 1953, when he resigned from active work to take matters more easily.

★ ★ ★

Ernie, as he was affectionately known to his many friends, was a man of unusual ability and was responsible for many inportant innovations in the manufacture of wire and insulated wire. His work enriched the wire industry and he was one of the earlier stalwarts who contributed much to the growth of The Association. His passing is noted with genuine regret.

Ernest W. Clark

Joins Staff of Heat & Control

N. W. Richardson has discontinued his Denver, Colo. activity with **American Industrial Furnace Co.,** and has joined the Main Office staff of **Heat and Control, Inc.,** at San Francisco, Calif., according to an announcement made by Charles A. Blesch, President of the latter company.

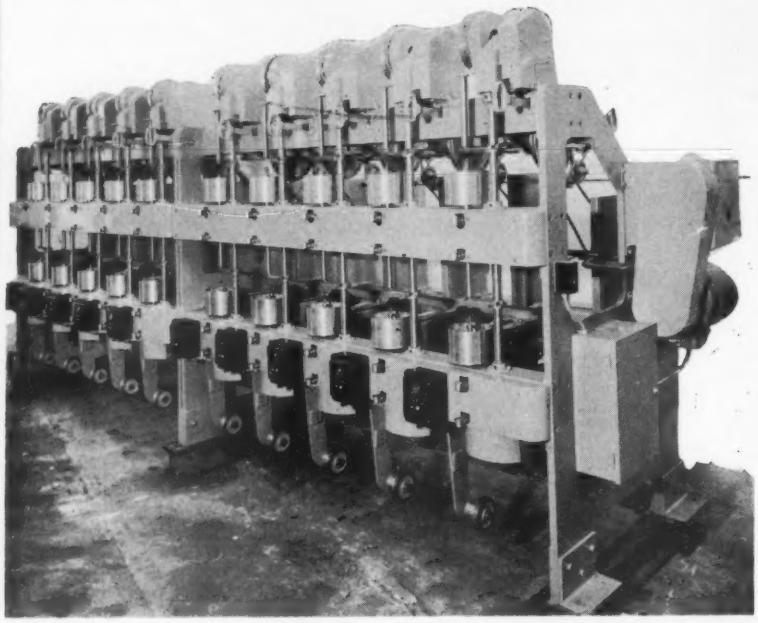
★ ★ ★

He will be Manager of Mill Process Heat Application activities for Heat and Control, Inc., and will also support Los Angeles and Seattle office activity in that field.

★ ★ ★

Mr. Richardson has had wide experience in the steel and nonferrous mill field. He was formerly associated with Colorado Fuel and Iron Corporation, National Tube Division, U. S. Steel Corporation and Salem Engineering Company.

2D-10-MBB INSULATION WINDING MACHINE No. 1129



APPLIES DOUBLE COVER TO 10 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B&S GAUGE (.057" TO .018" or 1.450MM TO .455MM). STANDARD CAPSTANS 8" DIAMETER. SUPPLY WIRE LETOFFS AND TAKE-UPS ARE AT REAR OF MACHINE NOT SHOWN. MACHINE CAN BE ARRANGED SPECIAL WITH 12" DIAMETER CAPSTANS FOR HEAVIER WIRES.

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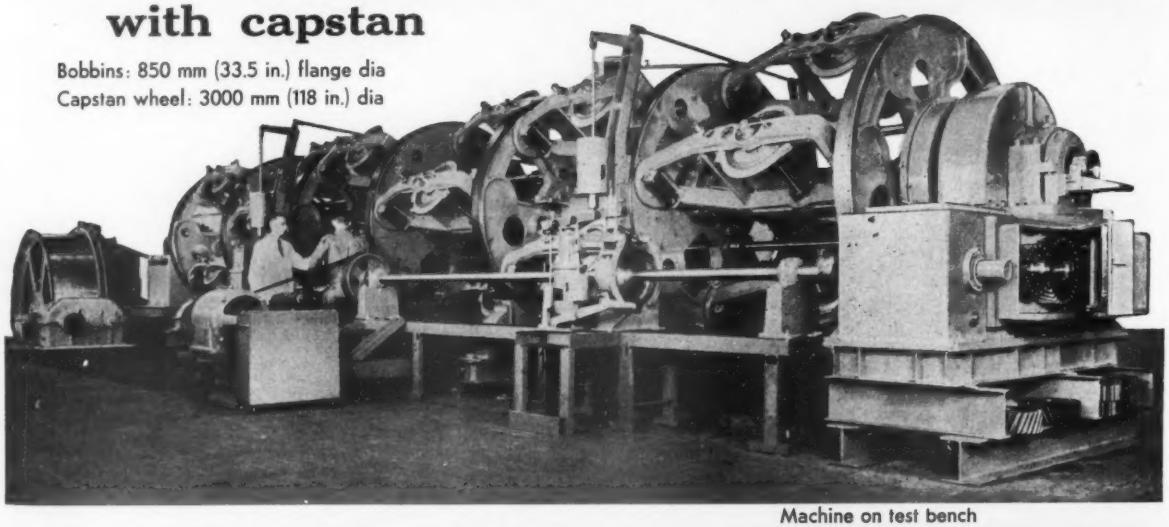
PHILADELPHIA 33 PENNSYLVANIA U.S.A.

24-bobbin CAGE STRANDING MACHINE with capstan

Bobbins: 850 mm (33.5 in.) flange dia
Capstan wheel: 3000 mm (118 in.) dia



Machine on test bench

J. A. KRAFT • MASCHINENFABRIK • OLPE/WESTF. GERMANY

SOLE REPRESENTATIVE IN THE U.S.A. AND CANADA:

HANCOR, INC., 468 Fourth Ave., New York 16, N. Y.

INDUSTRIAL MACHINERY

District Manager at Duluth for A. S. & W.

C. A. Purbaugh has been appointed Duluth district manager of operations for **U. S. Steel's American Steel & Wire Division** according to an announcement by **Harry L. Jenter,** vice president of operations. He succeeds **Harold Cope,** who retired after 47 years of U. S. Steel service.

★ ★ ★

Mr. Purbaugh, formerly assistant distict manager of operations, was born in Connellsville, Pa. He attended Pennsylvania State University and the University of Pittsburgh, graduating from the latter with a degree of B. S. in Metallurgy.

★ ★ ★

He began his career with American Steel & Wire in 1935 as a clerk in the open hearth department at the Donora, Pa., Works. Advancing to foreman, he was transferred to Duluth as assistant works metallurgist in 1941. In 1945 he was made open hearth superintendent and on January 1, 1950 became general superintendent, the post he held when he was promoted to assistant district manager of operations last September.

To Manage Polyethylene Plant

Byron J. Anderson has been named Manager of the polyethylene plant which will be built at Houston, Texas, by **National Petro-Chemicals Corporation.** The announcement was made by **Robert H. Cornwall,** Vice President in charge of production for **U. S. Industrial Chemicals Co.** National is a subsidiary of U. S. I. and Panhandle Eastern Pipeline Company.

★ ★ ★

Mr. Anderson graduated from the University of Alberta in Canada with a Bachelor of Science in Chemical Engineering degree in 1943 and joined National in 1952.

Engineer Joins Sam Tour

Paul Zoffmann (M. S. in Chemistry 1931) has been appointed Technical Director of **Sam Tour & Co., Inc.** and its affiliate, **The American Standards Testing Bureau, Inc.**

★ ★ ★

He will supervise the chemical and metallurgical laboratories, assist in research and development programs in the corrosion fields, development of special alloys, in plant design and operation and in investigations of material failures.

Operations Manager of Niles Plant

National-Standard Company has appointed **Louis R. Berner** manager of operations at its Niles plant. He has worked both in manufacturing and purchasing capacities since joining National-Standard in 1949. Following Air Force service in World War II, Mr. Berner graduated from Purdue University with a degree in trade and industrial education.

Stelco Appointments

H. M. Griffith, vice president, the **Steel Company of Canada,** announced that **L. H. Chater** has been appointed chief engineer of the company and that **D. C. McCrady** will succeed him as chief

What's your problem?
MAYBE WE CAN HELP!
We can design and make a lot of things besides spools. We have the imagination, the research facilities and the engineering experience to take tough problems off your hands. Why not tap that experience for your own use?
WHAT KIND OF A SPECIALTY DO YOU NEED?
• Special equipment?
• Specially designed machinery?
• A fabricated piece you can't get anywhere else?
• Experimental and development work?
Write or call us today
Acrometal makes a complete line of precision aluminum (and steel) spools for processing and shipping fine wire. Also disposable reels and packages up to 1,000 lbs. capacity.
ACROMETAL PRODUCTS, INC.
616 Fifth Street N., Minneapolis 1, Minn.

engineer of Hamilton and Ontario Works.

★ ★ ★

The appointments resulted in these staff moves at Hamilton Works: **M. A. Leishman,** works manager, announced that **J. G. Mitchell** has been appointed superintendent of the electrical department to succeed Mr. McCrady and **C. F. Dover** has been named assistant superintendent of this department.

Kaiser Appoints Engineer

The appointment of **Hollis G. McLaughlin** as manager of industrial engineering for the aluminum division of **Kaiser Aluminum & Chemical Corp.,** has been announced by **S. B. White,** vice president.

★ ★ ★

Mr. McLaughlin came to Kaiser Aluminum in 1951 as a management analyst. He later was appointed administrative project manager of the company's heavy press program at the Halethorpe, Maryland, plant, and returned to the company's Oakland, California, headquarters in 1953 in an administrative capacity. He holds a B. S. degree in business administration from the University of California.

Made Plant Manager

Harold J. Bergum, 38, has joined **Nylok-Detroit Corp.** as plant manager in charge of the company's new manufacturing facilities at 1893 Barrett Road, Troy, Mich.

★ ★ ★

His new responsibilities will include direct supervision of all processing operations for Nylok-Detroit's line of patented self locking-sealing-adjusting threaded parts—as well as scheduling, inventory control and personnel matters.

To Take Charge of Operations

The Universal-Cyclops Steel Corp., Bridgeville, Pa., has announced the election of **Richard C. Diehl** as Vice President of Operations.

★ ★ ★

Mr. Diehl has an intensive background in the metals industry. He was formerly president of the **Chase Brass and Copper Co.,** and served in various management and metallurgical capacities with **Wheeling Steel Corp.,** and the Armco Steel Corp.

★ ★ ★

Universal-Cyclops has plants in Bridgeville and Titusville, Pa., and is constructing a new stainless steel plant in Coshocton, Ohio.

Manufacturing Executive is Rotary International Officer

J. Lewis Unsworth, District Sales Manager of **John A. Roebling's Sons Corporation,** manufacturers of steel rods and wire in Trenton, N. J., is serving as a District Governor of Rotary International, world-wide service organization, for the 1957-58 fiscal year.

★ ★ ★

As Governor of one of the four Rotary Districts in New Jersey, Mr. Unsworth coordinates the activities of 39 Rotary Clubs. During the year, he will visit each Club to offer advice and assistance on

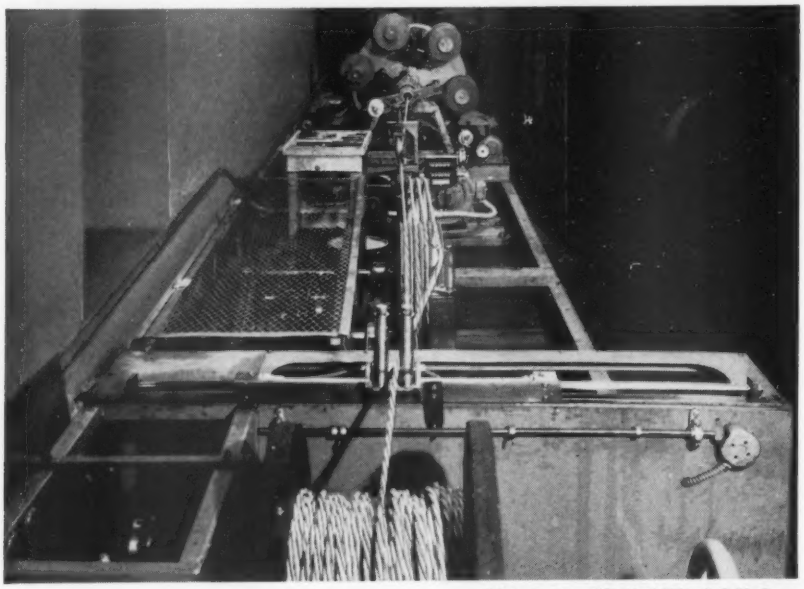


Photo courtesy of Bedford Wire & Cable Corp.

For Cleaner, More Economical Operation, Use

PLYMKRAFT

CABLE FILLER

Just name the type put up and the type treatment—such as wax, jute saturant, anthracene—to conform with your equipment requirements and see the difference Plymkraft can make in your operation. Cleaner to use, always uniform and made to a fine tolerance, these fillers are ideal for high speed cablers where extra strength is a must. If you would like to know how you can have a cleaner, more economical cable operation, ask your Plymouth Plymkraft salesman—Or if you have a cable filler problem our engineers are available for consultation—just write.

PLYMKRAFT DIVISION

PLYMOUTH CORDAGE COMPANY

PLYMOUTH, MASSACHUSETTS

Rotary service activities and administration.

★ ★ ★

The Rotary organization now encompasses 107 countries throughout the world. The 450,000 business and professional executives who are members of 9,600 Rotary Clubs work together to promote the Rotary program of community betterment activities and high standards in business.

Ansonia Appoints Sales Executive

Alden P. Lunt, President of **The Ansonia Wire & Cable Co.,** has announced the appointment of **Albert J. W. Novak** as assistant to the President for Sales and Marketing.

★ ★ ★

Mr. Novak comes with the Company from Brush Electronics, with whom he was successively Sales Manager and then Vice President and General Manager of their Texas Division at Houston.

★ ★ ★

He assumed his responsibilities on November 1, 1957 and is located at the home office of the Company in Ashton, R. I.

Herman J. Blaser

Herman J. Blaser, 58, wire and screen manufacturing and banking executive died on Nov. 8th. He lived in Fostoria, Ohio, and was president and general manager of the **Seneca Wire & Manufacturing Co.,** Fostoria.

★ ★ ★

He was also president of the **Keystone Wire Cloth Co.,** Hanover, Pa., and of the **Standard Wire Cloth & Screen Co.,** Brookhaven, Miss., as well as vice president of the Home Window Co., and a director of the Commercial Bank & Savings Co., both of Fostoria.

★ ★ ★

A native of Fostoria, Mr. Blaser studied at Tiffin Business University, later serving as an army field clerk during World War I.

Charles P. Cutler

Charles P. Cutler, 62, Manager of **Republic Steel Corporation's** South Chicago district, died on November 8, 1957. Funeral services were held on the following Tuesday in the chapel at Hammond, with interment at the Ridgelawn Cemetary in Gary.

★ ★ ★

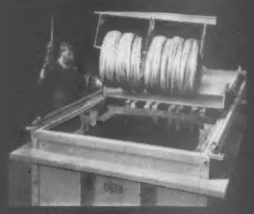
Mr. Cutler had been made manager of the South Chicago operations in 1945, after 30 years with the company.

Heads Wire Mill at Buffalo

William R. Cook has been appointed Wire Mill Superintendent of the Buffalo Plant of the **Wickwire Spencer Steel Div.,** The Colorado Fuel & Iron Corp., it has been announced by Carl J. Murray, Buffalo Plant Manager.

★ ★ ★

Before joining CF & I, Mr. Cook had been associated with **Union Wire Rope Corp.,** Kansas City, Mo., as Assistant Wire Mill Superintendent. He is a native of Kansas City and an alumnus of Kansas City Teachers College.



Far greater production in less space with lower cost equipment . . . for all steel and non-ferrous wire.

The fastest, most uniform way to heat treat wire* is often far lowest in cost!

AJAX
HULTGREN
electric SALT BATH furnaces

* Write for case history bulletins on Ajax Electric Salt Baths for

- ☐ Annealing ☐ Patenting
- ☐ Cleaning, Preheating
- ☐ Descaling
- ☐ Fluxing for Aluminizing

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ASSOCIATED COMPANIES:
AJAX ELECTRIC FURNACE CORP. • AJAX ELECTROTHERMIC CORP. • AJAX ENGINEERING CORP.

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,811,746 APPARATUS FOR PROVIDING A STRIPED COVERING ON A WIRE, patented November 5, 1957 by Brooke W. Lerch, Stoneleigh, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Apparatus for applying plastic insulation and color striping a moving conductor is disclosed comprising an applicator for applying a coating of insulating material on a moving conductor, a striper of the type using a striping compound which is adversely affected by heat, mounted adjacent the applicator, and a liquid-cooled baffle mounted between the applicator and striper for protecting the striper from the heat of the applicator.

★ ★ ★

No. 2,811,882, LUGGING DISC FOR STRAINER WIRE, patented November 5, 1957 by Jack Hess, Houston, Tex., assignor to Houston Well Screen Company, Houston, Tex.

There are eleven claims to the patent to an apparatus for lugging wire where there is die rolling with a recurring pattern.

★ ★ ★

No. 2,812,098, CONVERTIBLE UTENSIL, patented November 5, 1957 by Paul Escaut, Beziers, France.

A basket-like receptacle or utensil is provided, constructed of flexible wire and including two handles of more rigid wire movable to open the receptacle for filling or emptying.

★ ★ ★

No. 2,812,136, CORE WINDING APPARATUS, patented November 5, 1957 by Francis Stern-Montagny, Poughkeepsie, N. Y., assignor to International Business Machines Corporation, New York, N. Y., a corporation of New York.

An apparatus is disclosed for guiding and electrically counting turns of wire as it is manually wound upon a core.

★ ★ ★

No. 2,812,143, TOROIDAL COIL WINDING MACHINE, patented November 5, 1957 by James R. Goodykoontz, Jr., Venice, Calif., assignor to Hughes Aircraft Company, Culver City, Calif., a corporation of Delaware.

The machine includes a sewing needle, made of a magnetic material and threaded with the wire to be wound on the toroidal core, resting on the working surface in the magnetic field of a magnet, this sewing needle being movable under the influence of the magnet along a path on the surface corresponding to the path of movement of the magnet; and a device for continuously moving the magnet in a predetermined closed path such that the needle is successively moved through the center of the core, whereby a turn of wire is wound upon the core with each passing of the needle through the core.

★ ★ ★

No. 2,812,187, NESTABLE SHOPPING CART WITH MOVABLE BOTTOM, patented November 5, 1957 by William J. Nicholl, La Crescenta, and Walter L. Headley, Glendale, Calif.

A wire basket for the cart is provided, wherein the movable bottom of the basket is progressively lowered through the basket as articles are added to other articles upon the basket bottom. The bottom is spring biased.

★ ★ ★

No. 2,812,608, GOOSE DECOY, patented November 12, 1957 by Phillip H. Jones, Omaha, Nebr.

The decoy includes a number of wire members adapted to permit selective collapsing or extension of a canvas cover which simulates a goose or the like. There are five claims.

★ ★ ★

ANNOUNCEMENT

DAVIS-STANDARD, Mystic, Connecticut announces the appointment of the E. V. Larson Co., Ltd. as their Canadian representative.

The E. V. Larson Co. territory includes all of Canada for the entire line of D-S Thermoplastic and Rubber Extruders and Wire Insulating Machinery.

All inquiries in Canada regarding D-S machinery should be directed to:

Mr. E. V. Larson, *President*
E. V. Larson Co., Ltd.
572 Queen Street East
Toronto 2, Ontario

Telephone: EMpire 4-2111

D-S MYSTIC CONNECTICUT U.S.A.

DAVIS-STANDARD

Division of FRANKLIN RESEARCH CORPORATION

18 WATER STREET, MYSTIC, CONNECTICUT

IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND

No. 2,812,741, APPARATUS FOR COATING WIRE, patented November 12, 1957 by James A. O'Connor, Fort Wayne, Ind., assignor to Essex Wire Corporation.

A device for applying coating material to vertically moving wire strands is disclosed, consisting of a number of coating material inlet tubes in spaced vertical relation, applicator fingers mounted on these tubes, the applicator fingers further characterized by a coating chamber in communication with the coating inlet tube and inlet and outlet openings to permit the ingress and egress of a wire strand from the chamber, and a device to rotate the fingers to permit the withdrawal of the finger from coating engagement with a wire strand.

★ ★ ★

No. 2,812,803, WIRE SPRING STRUCTURE, patented November 12, 1957 by William H. Neely, Cleveland, Ohio, assignor to The Universal Wire Spring Company, Bedford, Ohio, a corporation of Ohio.

A wire structure for seats is disclosed, including an elongated, sinuously corrugated wire member, supporting and attachment members, at least one of which is V-shaped extended from opposite end portions of the wire member, and a V-shaped cantilever-like supporting member for the central area of the wire member, the cantilever-like supporting member including a short arm attached to the central bottom area of the wire member and a long arm extended from the short arm in acute angular relation with respect thereto toward the V-shaped supporting and attachment member, the long arm being attached to the V-shaped supporting and attachment member.

★ ★ ★

No. 2,812,875, COLLAPSIBLE WIRE FREEZER BASKET, patented November 12, 1957 by Edmund J. Buzicky and Everett E. Beson, St. Paul, Minn., assignors, by mesne assignments, to Whirlpool-Seeger Corporation, a corporation of Delaware.

Included is a pair of wire basket sections in telescopic relationship.

★ ★ ★

No. 2,813,552, PROCESS FOR THE MANUFACTURE OF ELECTRICALLY WELDED WIRE NETS, patented November 19, 1957 by Walter Roesler, Soest, Germany.

There are five claims to this patent for a process for the manufacture of wire netting from longitudinal and cross wires which are welded at the points of intersection.

★ ★ ★

No. 2,813,643, COIL HANDLING APPARATUS, patented November 19, 1957 by Alfred F. Prentice, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts.

A coil handling apparatus for transferring coils from a hook carrier to an assembling table located below and to one side of the carrier is disclosed. The assembly of parts is such that the coil rolls transversely of the direction of motion of the carrier out of a cradle to a table.

★ ★ ★

No. 2,813,809, WIRE COVERED WITH A HYDROGENATED RUBBERY BUTADIENE POLYMER, patented November 19, 1957 by Rufus V. Jones and Charles W. Moberly, Bartlesville, Okla., assignors to Phillips Petroleum Company, a corporation of Delaware.

The wire is covered with a flexible vulcanized rubbery polymer as homopolymers of butadiene and copolymers of butadiene and styrene containing not over 30 percent by weight of styrene, the unsaturation of the polymer having been reduced by hydrogenation to a

(*Please turn to page* 106)

NEMA'S Wire and Cable Section Holds Annual Meeting in Atlantic City

(*Continued from page* 76)

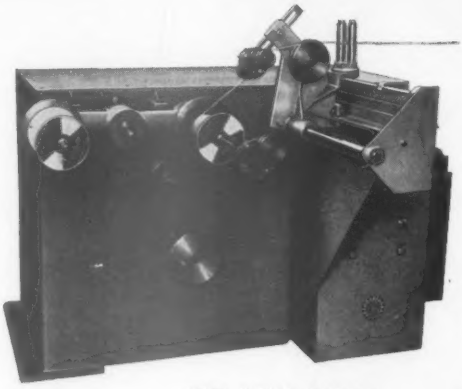
products of a basic industry. The objective, of course, is to make critical recommendations for the improvements and reorganization, if necessary, of manufacturing methods within an industry.

★ ★ ★

"The objective of BDSA is to maintain control and give assistance to manufacturing facilities in obtaining needed materials only where necessary to accomplish

. . . for the BEST in RESPOOLERS

THINK OF WIM



Wim Model "B" Remote Control Unit

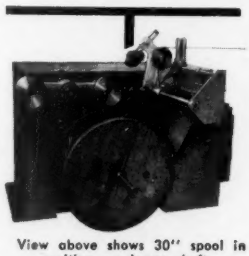
THE WIM MODEL "B" RESPOOLER

THE MOST VERSATILE REWINDER AVAILABLE TODAY

Here is a machine that spools or coils at speeds up to 1500 F.P.M. It will accomodate spools up to 18" in diameter on the upper shafts and up to 30" in diameter on the lower. A power operated indexing head, designed to handle heavy spools up to 18", insures maximum safety—"eliminates operator fatigue" and reduces down time. This unit equipped with a 3 H.P. variable speed drive and a four speed transmission guarantees constant product speed with maximum pulling power for various barrel diameters. Phone, write or wire for complete details.

FEATURES

1. High and low winding positions.
2. Power operated indexing heads.
3. All electric traverse.
4. Adjustable line speed 10:1 range.
5. Four speed transmission.
6. Complete intergrated control including disconnect switch.



View above shows 30" spool in position on lower shaft.

WIM

WIRE INSULATING MACHINERY, INC.

Division of Machinery Electrification, Inc.

35 HUDSON ST. NORTHBORO, MASS.

military and atomic energy programs. These programs are carried on so as to avoid dislocation and hardship in the civilian economy."

★ ★ ★

M. W. Reid, industrial relations specialist, **General Electric Co.** — told his listeners: "You will recall that the union very violently attacked the yellow dog contract, and I believe rightly so. Many years ago the yellow dog contract deprived men who worked under it of the right to join a union. It has been outlawed. Today's union shop contract deprives men who work under it of the right not to join a union. It should be outlawed.

★ ★ ★

"It is my firm conviction that unions will eventually accept the principle of voluntary membership as being consistent with their basic philosophy and as being in their long term best interest. This would result in a stronger labor movement, with the unions taking their rightful place as respected members of our business society. This will not come about of its own accord. We, as businessmen, must be willing to stand up and be counted as opposing a practice that could lead to the very destruction of our free society."

★ ★ ★

E. D. Jones, manager, Commercial Research Department, **American Steel and Wire Div. U.S. Steel Corp.,** explained proposals to start NEMA wire and statistical programs based on sales to industries. Such a program, he stated, will make it possible for industry forecasting to be undertaken.

★ ★ ★

George Albiez, president, National Association of Electrical Distributors, discussed the wire and cable industry from a distributor's viewpoint. He pointed out the inventory problems created by the substantial number of types of wire and cable insulations available, adding that many of them are intended for similar applications.

★ ★ ★

Harry Leopold, John A. Roebling's Sons Corp., discussed activities conducted by the Section's Marketing and Statistical Committee during the last two years; **Richard Steiner,** assistant general sales manager, **General Cable Corp.,** reviewed efforts being made to refine present NEMA statistics and proposals to institute geographical statistical programs, and **A. Wacker,** vice president, **General Cable Corp.,** reported that a recently formed Section committee is attempting to develop new types of non-returnable magnet wire packaging.

★ ★ ★

Additional speakers included **R. L. Reading, Belden Manufacturing Co.; C. G. Skidmore,** vice president in charge of sales, **The Louis Allis Co.** (chairman, Advisory Committee, NEMA Motor and Generator Section), and **R. E. Ingmire,** manager, Inter-Industry Activities, Live Better Electrically Project.

Promotions at Massena

The Aluminum Company of America has appointed **Erwin G. Schoeffel** to the post of Assistant Operations Manager. He was previously Works Smelting Manager, in which position he has been succeeded by **Ernest T. Wagner.**

Let us help untangle your WIRE problems...

We're old hands at it. If you use manufacturers' wire, you may have a lot to gain by getting in touch with your nearby Sheffield office. Our metallurgists and wire specialists can analyze your wire uses and make recommendations that may speed production, improve products and cut costs for you.

Sheffield's steelmaking and wire drawing facilities enable us to supply the right wire for any set of specifications. We're doing it for manufacturers and fabricators of more than 2000 different products. We'll not only come up with the right wire for you, but we are often able to recommend more economical ordering units.

Finally, there's Sheffield packaging. Our Kone-Pak* gives you in one continuous spool the equivalent of 2 to 40 ordinary coils. Kone-Pak saves handling and machine downtime for loading. With it comes the protection of specially treated wrapping that assures rust-free delivery and storage of your wire.

Just call your nearest Sheffield office.

Pat. Pending

SHEFFIELD
ARMCO
Wire Products

Sheffield serves the Midwest, Southwest and Gulf Coast with one of the most diversified lines of finished and semi-finished steel products in the steelmaking industry.

SHEFFIELD DIVISION ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA — OFFICES IN PRINCIPAL CITIES

The Cabling Time Equation

(*Continued from page 69*)

n	K_1	g	f
2	30	50.08	3.333
3	35	66.76	2.652
4	40	83.44	2.071
5	15	100.9	4.936
6	15	117.8	4.444
7	15	134.8	4.035
8	15	151.7	3.690
9	15	168.7	3.398
10	15	185.7	3.147
11	15	202.7	2.931
12	15	219.7	2.741
13	15	236.7	2.575
14	15	253.7	2.429
15	15	270.7	2.295
16	15	287.7	2.177
17	15	304.8	2.069
18	15	321.7	1.973
19	15	338.7	1.883
20	15	355.8	1.803
21	15	372.8	1.729
22	15	389.8	1.661
23	15	406.9	1.599
24	15	423.9	1.539
25	15	440.9	1.485
26	15	457.9	1.433
27	15	474.9	1.387
28	15	491.9	1.344
29	15	509.0	1.303
30	15	526.0	1.262
31	15	542.9	1.226
32	15	560.0	1.192
33	15	577.1	1.156

companying curve.

★ ★ ★

It is interesting to note that in the final analysis, when K, R, M, C, and T'_s have been established for some particular machine and product and their values introduced into the equation, there is obtained a simple hyperbolic expression containing only the conductor diameter as independent variable, namely

$$T = A/d + B$$

Appendix

I. A graph of the relationship between T'_s and the factor $1 + T'_s/(S-T'_s)$, where S is the shift length in hours is given herewith for rapid determination of this factor.

II. The reel capacity formula, referred to earlier, is given below:

$$C = 0.0589 \frac{T}{d^2} \cdot \left[(F - 2x)^2 - D^2 \right] \text{ feet}$$

where,

C = reel capacity, feet
X = rim clearance, inches
T = length of inside traverse, inches
D = core diameter, inches
d = cable diameter, inches
f = face diameter, inches

The formula allows for a 90% packing factor.

The Extrusion of "Teflon" 100X Perfluorocarbon Resin A New Melt Extrudable Material for Wire Insulation

(*Continued from page 73*)

"Teflon" 100X is also an excellent jacketing material. We have successfully jacketed in thicknesses as low as 3 mils over shielded and unshielded primaries as well as multi-conductor and coaxial cables. We have jacketed over glass and silver braids, "Teflon" tetrafluoroethylene resins, silicone rubber, and a primary of "Teflon" 100X.

Use HEANIUM®
HM-1
(TWICE ACTUAL SIZE)
WITHSTANDS HI-SPEED PRESSURE OF SYNTHETIC YARNS AND WIRE BY THE TONS
If guide wear is a problem in your mill . . .
try Heanium®
IS THE BEST GUIDE TO LOW COSTS.
HM-1
EFT-437
ES-500
EF-292
EFGSL-312
OTHER STANDARD SIZES AVAILABLE
Test samples of HEANIUM stock guides will be furnished without charge.
Address sample requests to Dept. 9.
HEANY INDUSTRIAL CERAMIC CORP.
New Haven 3, Conn.
HEANY INDUSTRIAL CERAMIC CORP.
NEW HAVEN 3, CONNECTICUT

In the processing of "Teflon" 100X a conventional extruder is used. It should be electrically heated and capable of operating up to 800°F. We recommend at least an 18/1 L to D ratio although we have made satisfactory extrusions with shorter barrels. A metering type screw with a 3/1 compression ratio is used. Exhaust ventilation should be employed at the head and hopper of the extruder. For short runs, we have had no difficulty with corrosion using non-corrosion resistance materials of construction; however, for long runs we recommend corrosion-resistant alloys. X alloy 306* barrel liners and high-nickel alloys for screws, crossheads, and dies are suggested for this purpose.

★ ★ ★

We are thoroughly sold on the use of a stock thermocouple** to measure the true temperature of the melt.

★ ★ ★

It is important that an extruder be thoroughly cleaned before use of "Teflon" 100X, for at the high operating temperatures, organic materials will carbonize.

★ ★ ★

In processing of "Teflon" 100X onto wire, a tubing type extrusion is employed. The melt has excellent draw properties and drawdowns of well over 100/1 have been used. In an E-22 type hookup wire, this would mean an 0.500 inch x a .300 inch die-guider combination. It is necessary to apply slight vacuum. The resin is readily extruded at temperatures of 650°F. to 740°F. Above 740°F. slight decomposition starts to take place.

★ ★ ★

"Teflon" 100X is prone to tear or fracture in the land of an extrusion die if it is extruded above a certain critical rate and so the tubing type extrusion is beneficial in gaining high rates.

★ ★ ★

In producing miniature coaxial cable cores, a lower melt temperature has been used to gain higher melt viscosity and greater melt stability. A hot-water quench bath has been employed successfully to eliminate shrinkage voids in the coating.

★ ★ ★

Satisfactory pigmentation has been obtained by dry blending. High-temperature pigments in a fine particle size are necessary and concentrations of less than one per cent are normally used.

★ ★ ★

The clean-up of the extruder after extrusion is accomplished by use of a purge resin consisting of a mixture of one part polyethylene and four parts barium sulfate*. Purging reduces the safety hazards, the possibility of corrosion, and the time needed for clean-up.

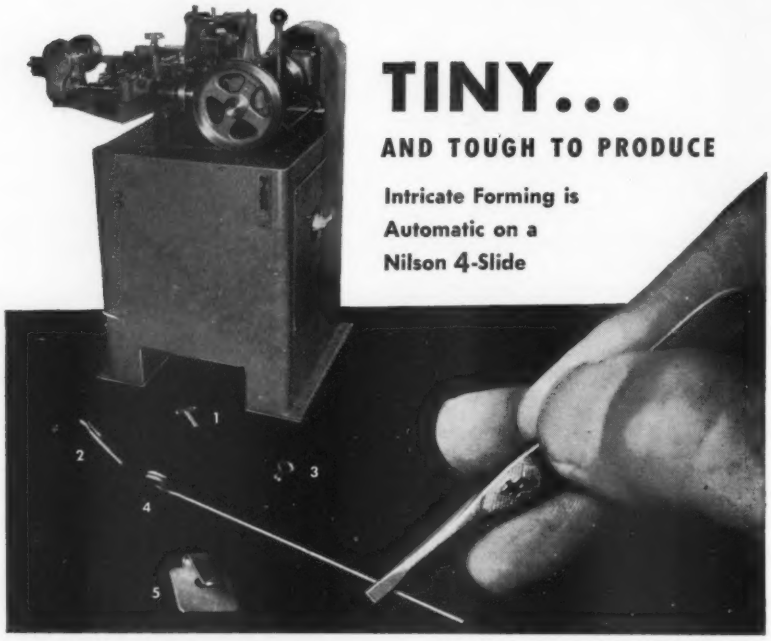
★ ★ ★

To summarize, "Teflon" 100X perfluorocarbon resin is a new melt-extrudable material which is processed rapidly and efficiently by conventional processing equipment. It has an outstanding combination of properties that make it an ideal wire insulating and jacketing material. It is available at present in developmental quantities for evaluation and testing in the wire and cable field.

* Industrial Research Laboratories, Los Angeles 11, Calif.

** Available from Thermoelectric Co., Saddle River, N. J.

* Available from American Molding Powder Co., Brooklyn, N. Y. or Gering Products, Kenilworth, N. J.



Small wire and ribbon metal forms shown here in actual size are typical examples of modern precision production on a Nilson #00 4-Slide. Compact in size, this 4-Slide produces up to 375 pieces per minute in material not exceeding .040 dia. and 3" in blank length. Easily access to tooling, accurate feeding to within .003, and rugged construction assures years of precision forming.

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2 **Electrical Contact** . . . .0076" x .0030" wide phosphor bronze formed at a production rate of 200 per minute.

3 **Swivel Part** . . . .025" brass wire. Heading operation includes eye formed with tolerances within .008", shank within .003 tolerance. Production rate, 300 per minute.

4 **Leadwire** . . . .026" soft tinned copper wire formed at a rate of 140 per minute with two 7/64" diameter windings.

5 **Contact Part** . . . .010" x 3/8" wide phosphor bronze formed at 175 per minute.

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The Annual Convention of The Wire Association

(*Continued from page 65*)

Following a motion to ratify the acts of the Officers and Directors in the preceding year, which was passed unanimously, the meeting was adjourned.

The Stag Smoker-Dinner

515 persons crowded into the Ballroom for this annual feature of the Convention at 7:30 o'clock on Wednesday evening.

★ ★ ★

Preceding the dinner the bar was opened at 6:30 P.M., allowing an hour for refreshments, during which the group was entertained with music and a floor show behind the bar.

★ ★ ★

After the dinner, the big show got under way with an introduction by Eber J. Hubbard, Chairman of the Entertainment Committee, to what was to be presented.

★ ★ ★

The several acts were excellent and continued for two hours, some of them involving audience participation. The people were in a festive mood and appeared to enjoy the acts thoroughly. Our congratulations to Mr. Hubbard for again selecting and staging so good a show.

The Plant Inspection Tours

Two tours were made by the Ferrous and Non-Ferrous groups respectively.

★ ★ ★

The former, 128 strong, left in busses at 9:00 A.M. for Joliet, Illinois, to visit **American Steel and Wire's** plant there. At this mammoth plant they observed wire production operations from rod rolling to finished products. Through the courtesy of the company, the group was entertained for luncheon, and were returned to the hotel late in the afternoon.

★ ★ ★

Approximately 60 persons interested in Non-Ferrous matters went to the Chicago plant of the **Revere**

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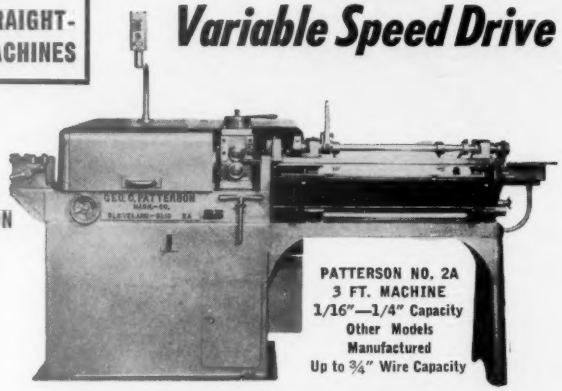

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Copper and Brass Company, where they saw a large variety of copper and aluminum sheet and strip rolling operations, including the laboratory in which metals are tested and checked in various stages of production, from ingot pouring to finished products. The tour of the mill proved very worth while and the company's visitors were returned to the hotel in time for lunch.

★ ★ ★

The Association is grateful to the management of these two mills for their hospitality and the opening of their doors to our members.

The Ladies

Besides accompanying their menfolk to the Annual Luncheon on Tuesday, the ladies were entertained through the courtesy of the **William Glader Machine Works,** with **Mrs. William J. Glader** serving as hostess, at the Chicago Athletic Club for a most enjoyable luncheon.

★ ★ ★

On Wednesday evening, while the Smoker-Dinner was in progress, through the courtesy and generosity of the **R. H. Miller Company** and **Standard Industrial Compounds Company,** they were tendered a cocktail party, followed by dinner at the Swedish Club. **Mrs. Walter A. Smigel** and **Mrs. John A. Moritz** were the hostesses on this delightful and hospitable occasion.

The Program Committee

No Convention can function successfully without a lot of hard work behind the scenes. The excellent result obtained for this fine convention is due entirely to the efforts of the Committee Chairmen and their members. These were:

GENERAL PROGRAM CHAIRMAN
John L. Sanderson, Supt., Wire Mills
Keystone Steel & Wire Company
Peoria, Illinois

CHAIRMAN, FERROUS COMMITTEE
John H. Corson, Mgr. of The Laboratory
Carpenter Steel Co., Reading, Pa.

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Union Wire Rope Corp.
Kansas City, Mo.

Carleton W. Garrett, Metallurgical Eng.
Jones & Laughlin Steel Corp.,
Aliquippa, Pa.

William H. Louder, Supt., Wire Mills
Bethlehem Steel Corp.
Williamsport, Pa.

Gordon T. Spare, Research Project Eng.
American Steel & Wire Div.
United States Steel Corp.
Cleveland, Ohio

CHAIRMAN, NON-FERROUS COMMITTEE

E. D. Bent, Chief Engineer
Wire and Cable Division
Northern Electric Co.,
Lachine, P.Q., Can.

COMMITTEE MEMBERS

Samuel C. Avallone, Div. Met.
Electric Cable Works,
American Steel & Wire Div.,
U. S. Steel Corp., Worcester, Mass.

Richard E. Hutchinson, Asst. Prod. Supt.
Kaiser Aluminum & Chemical Corp.,
Newark, Ohio

Alexander A. Kerr, Supt. Prod.,
Electrical Wire Div.
John A. Roebling's Sons Corp.
Trenton, N. J.

J. F. Stoltz, Eng., Rod and Wire Mfr.
Hawthorne Works, Western Elec. Co.
Chicago, Ill.

GENERAL ACTIVITIES EXECUTIVE SECRETARY

Richard E. Brown
The Wire Association
Stamford, Conn.

REGISTRATION

R. S. Spengel, Asst. Exec. Secy.
The Wire Association
Stamford, Conn.

ENTERTAINMENT

Eber J. Hubbard, Pres.
Hubbard Spool Co.
Garrett, Ind.

★ ★ ★

To these persons the Officers, Directors and members of **The Wire Association** extend their sincere thanks for a job well done.

★ ★ ★

The 1957 Annual Convention was one of the most enjoyable and instructive in the Association's history. It was characterized by a smoothness of running seldom experienced.

★ ★ ★

The technical sessions were outstanding in the high order of excellence of the papers and will provide the Committee on Awards with some difficult decisions.

★ ★ ★

Following the Convention, **Mr. Peter D. Gill,** Director of **The Spencer Wire Company Ltd.,** Wakefield, England, representing the British members, proceeded to the officers of **The Wire Association** at Stamford, Conn., to per-

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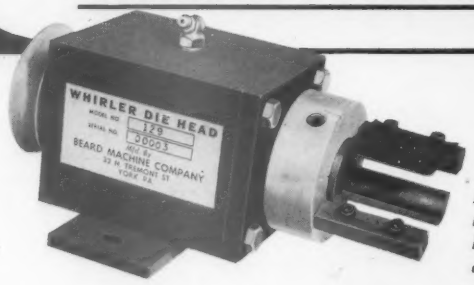

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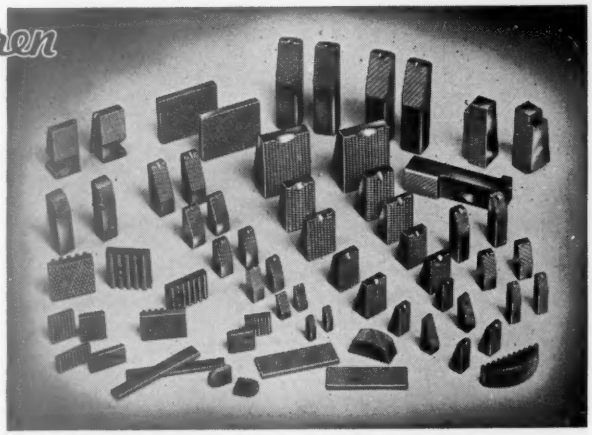

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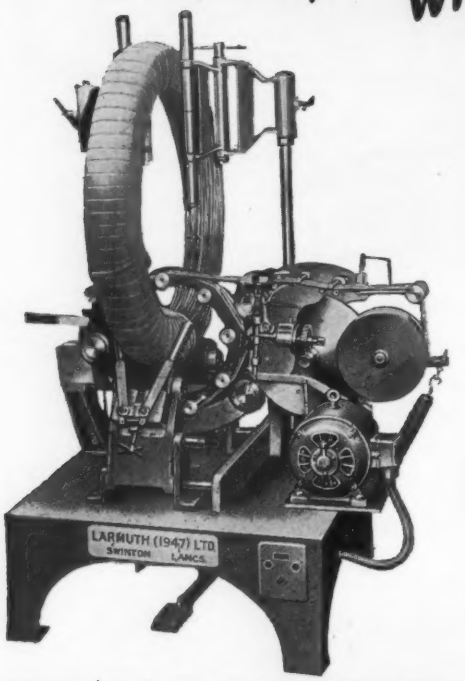

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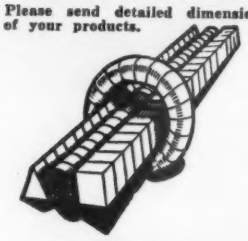

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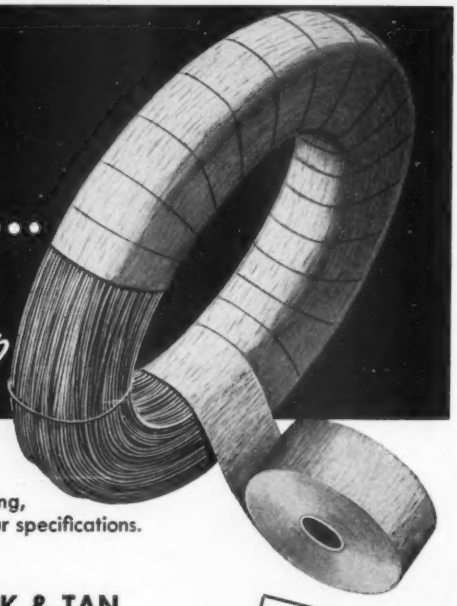

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form the annual ceremony of winding the antique 400-day clock presented to the Association by the British members in 1948. A pleasant session was held by those participating.

The Interrelationship Between Density and Dielectric Strength of High Pressure Polyethylene for High Voltage Applications in Insulated Wires

(*Continued from page* 72)

pending on what the annealed density is, there is the possibility that only 630 volts/mil dielectric strength can be obtained dropping the dielectric breakdown down to 31,500 volts.

★ ★ ★

From the data presented it has been shown that branched P. E. manufactured by the high pressure system must be insulated properly in order to maintain a high density and crystallinity to give maximum dielectric strength in cable.

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*(1) "Polyethylene in Wire and Cable Use" by Dr. H. J. Frey, Jr., and W. W. Spohn, Polychemicals Dept., E. I. Dupont Co.

*(2) DFD 2005-Bakelite Corp. "Recent Developments in Polyethylene Insulating Materials" by R. J. Lurie and J. A. Snyder, Bakelite Corp.

*(3) "Polythene" E. I. Dupont Co., Polychemicals Dept., 1946.

*(4) "Injection Molding Polyethylene" Dow Chemical Co., Plastics Dept., Bulletin 171-79.

*(5) "Polyethylenes" by A. E. Marbauer and C. S. Myers, Volume 90, 1946 From the Transactions of the Electrochemical Society.

*(6) Nat. P.E. 12253—Monsanto Chemical Co., Plastics Division.

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Proceedings of the Annual Convention of The Wire Association

(*Continued from page* 64)

whether it applied to particular grades or to all types of wire, Mr. De Witte said it did not apply to all grades, but to mild steel and high carbon. As to plating, it does not give the highest quality on commercial grades, but is satisfactory.

★ ★ ★

He was questioned about the hourly earnings of men, which he said were possibly in the proportion of 1 to 2 or 2-½, depending on the type of work.

★ ★ ★

As to specifications to suppliers of the three grades of steel mentioned, the speaker said one Belgian plant was offering 9 grades, so the upper limits for nitrogen are .0009, .0006 and .00035 and for sulphur or phosphorous .05, .04 and .03 are given. These can be intermixed for different grades.

★ ★ ★

There is a price differential between Bessemer and open hearth steel. Rods are bought from different countries and prices in them are not the same. In Belgium there are only open hearth steel mills using a scrap charge. No plant in Belgium makes open hearth steel from a molten charge.

★ ★ ★

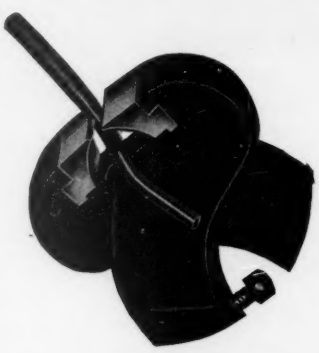
The smallest rod purchased is 5 mm, which is smaller than those of the U.S. The tolerance differs according to use, normal tolerance being plus or minus .3 mm. For high quality grades, tolerances are reduced. Swedish rods have a 4 mil tolerance and cost twice as much as German rod. We cannot advise as to whether Swedish is better than German for cold heading.

★ ★ ★

Tensiles of open hearth steels are not as high as for basic Bessemer rod. For making nails with a predetermined tensile strength, this is done by drawing only a few holes.

★ ★ ★

A member asked whether the improved Bessemer process that made the residual alloys lower was



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due to the greater use of pig iron instead of scrap. He was advised that this was correct.

★ ★ ★

Mr. De Witte noted that the investigation, the results of which were published on page 1212 of Wire and Wire Products, was planned by **Professor de Stryker,** Director of the Institute of Metallurgy, University of Louvain, Belgium. The wire drawing and some measurements were made at Zwevegem, whereas other experiments and measurements were made at the Institute by **Etienne Herinckx,** as a part of his work to secure a degree of metallurgical Engineer.

PAPER: "Mechanical Blast Cleaning of Wire Rod"
by Kenneth J. Sorace
Chief Project Engineer
The Lamson & Sessions Company
Cleveland, Ohio

PAPER: "From Hot Rolled Rod to Finished Wire Through the Process of Mechanical Blast Cleaning"
by Gilbert D. Dill
Engineer—Charge of Steel Division
Wheelabrator Corporation
Mishawaska, Indiana

For these two papers on the same subject, questions were withheld until both had been presented.

★ ★ ★

Mr. Dill replied to a question on cleaning stainless steel by saying they had cleaned some stainless rod, but have no installation in the field devoted to it. Blast-cleaned 300 and 400 series rod have been drawn with a 20 or 30% reduction.

★ ★ ★

Mr. Sorace said that bolt people had to have tremendous runs of parts, before tool life could be determined. Their first job was to develop the process, the second to try it out and the third to determine tool costs. So far there has been no indication of an increase in tool costs. Good lubrication is important in tool life.

★ ★ ★

A question on whether phosphate coating could be done at 200 F.P.M., drew from Mr. Dill an affirmative reply. He said that they

were applying the coatings faster than 200 feet and so was at least one mill.

★ ★ ★

On keeping shot clean, he said this was done with an air wash separator. Clean shot is essential or costs will go up. Cleaning takes out any abrasive smaller than .004". The shot is a high carbon, high manganese steel. It becomes harder and polished in use. As to cut wire shot, it is expensive, and the best abrasive is cheaper in the long run.

PAPER: "Stainless Steel Cold Heading Wire"
by S. E. Tyson
Metallurgist—Stainless Steels
The Carpenter Steel Company
Reading, Penna.

To a question on what effort an unbalanced chrome-nickel ratio had on heading, Mr. Tyson said variations in the chromium content could not mean too much, but variations in nickel is very important, for the less the nickel, the more rapid the work-hardening and the more difficult to do cold heading. An unbalanced ratio has no effect on plating.

★ ★ ★

For plating the wire, he stated that the dip process was not applicable to most stainless grades. It will work on less corrosion resistant materials like 440-C and M-410, but not on austenitic grades.

★ ★ ★

On mechanical properties, tensile and yield strength, these he said were published in Wire and Wire Products for October in Table II, page 1194, but had been omitted in giving the paper.

★ ★ ★

The lubricants used to facilitate cold heading are a grease like a lard, oil and stearic acid combination, a sulphurized oil or a good foundry type lubricant.

★ ★ ★

In the copper plating setup, the company uses the batch method, but it can be done otherwise. There are problems in copper plating, but the batch method is the

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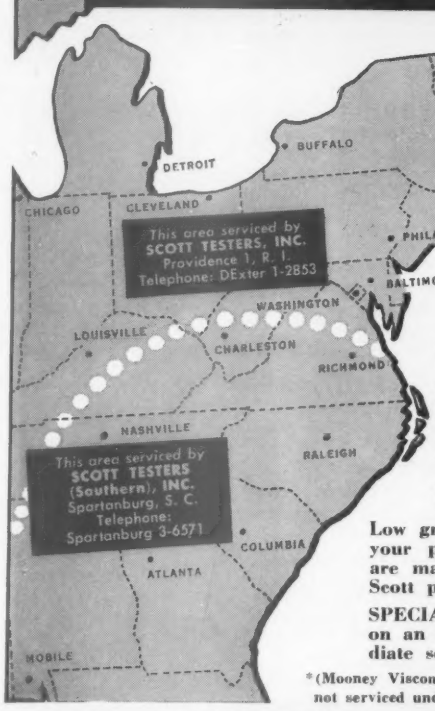

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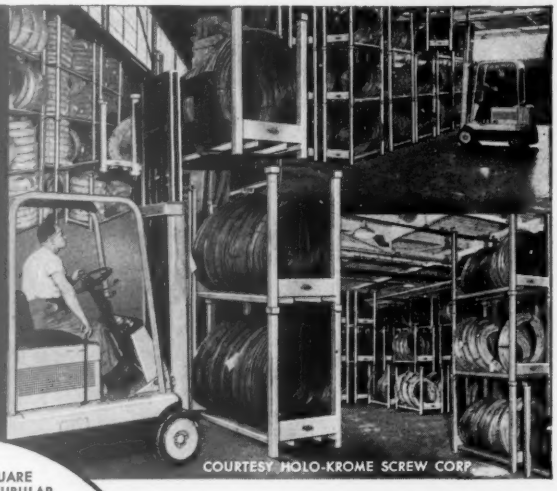

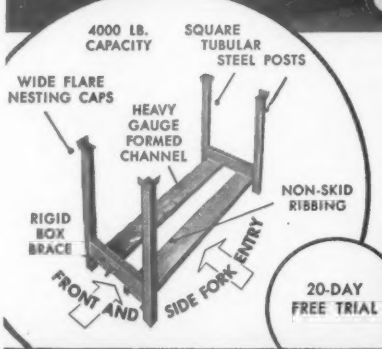

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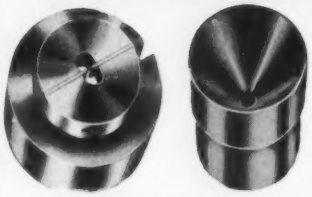

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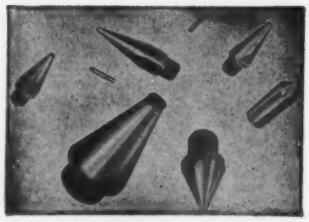

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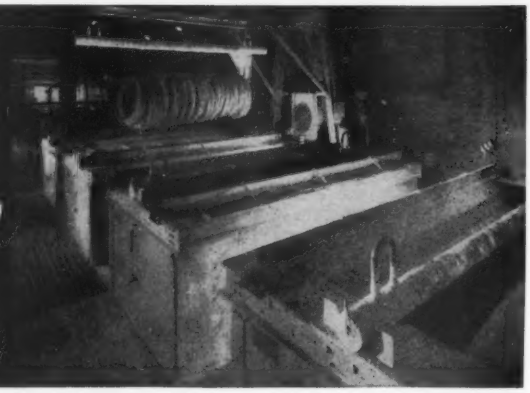

Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

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B. Greening Wire Co., Ltd.
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Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361
2,323,828
2,235,559
Canada 396,144
401,589

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key to successful production of stainless heading wire. Uniformity is obtained by rotating the coils.

★ ★ ★

Asked about the relation of concentricity to stress cracking and whether it was possible to see cracks with the unaided eye, he said he was not a cold heading expert from a machinery standpoint, but they could usually see cracks and they occurred mostly when blanks were not concentric.

★ ★ ★

Coming back to plating, it was pointed out that it is harder to get good adherence as the nickel increases, and still harder with iron-nickel than with 304. Mr. Tyson agreed, but said they secured good adherence with any austinitic grade.

★ ★ ★

On the matter of maximum percentage of total diameter in determining the seam depth on finished wire, he stated that they determine it in the end inspection. Coils are inspected 100% at the rod stage, which eliminates excessive seams. It is a visual inspection procedure with the aid of a file.

A Review of Recent Wire Patents

(*Continued from page* 95)

value of 10 to 30 percent of the original unsaturation.

★ ★ ★

No. 2,814,326, MECHANISM FOR SHAPING A WIRE CAGE BY STRETCHING, patented November 26, 1957 by Edward P. Washabaugh, Saginaw, Mich., assignor to American-Marietta Company, Chicago, Ill., a corporation of Illinois.

More specifically the mechanism is adapted for shaping a circular wire cage into an elliptical form. There are six claims.

★ ★ ★

No. 2,814,713, WELDING MACHINE FOR WIRE FABRICS, patented November 26, 1957 by Russell M. Glantzer, Washington, Pa., assignor to Tristate Engineering Company, Washington, Pa., a corporation of Maryland.

The machine is of the type that has upper and lower electrodes disposed transversely of the path of travel of wires through the machine, and includes means actuated by a feeding device at the limit of its forward movement, for operating the electrodes and rendering them active to grip the stay wires and weld them to the longitudinal wires.

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automatic Polishing Machine

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The Standard of the Wire Industry

About The Wire Association

(*Continued from page 58*)

of **Wickwire Spencer Steel Company,** presented a paper before the Association entitled "Grain Size and its Influence on the Manufacture of Steel Wire." This paper was the result of original research and proved to be of great value to the industry as a whole. However, after publication in **Wire and Wire Products,** the paper was copied verbatim by another publication without permission and without giving credit either to **The Wire Association** or **Wire and Wire Products.**

★ ★ ★

A copyright infringement action against the other publication was instituted, and the matter was settled out of court by stipulation by the other publication that they would discontinue the practice of copying Wire Association papers without permission.

★ ★ ★

In 1935, the action of the Association relative to copyright protection was put in resolution form, as passed upon by **Alfred Ekelman,** attorney, of New York City, and adopted by the Board of Directors.

★ ★ ★

In connection with the publication of papers and discussions, different ideas have been suggested from time to time and, in one or two cases, tried out over the years. As a result, the idea of printing the papers and discussions separately was given up and a final decision made to utilize **Wire and Wire Products** permanently for this purpose.

★ ★ ★

The 1932 edition of the Yearbook was the first one in which data, other than a list of members, was published, relating to the activities of the Association. This issue of the Yearbook contained a record of the proceedings of 1929, 1930 and 1931.

Specifications

In 1952, **The Wire Association** was approached by a group of the smaller cable manufacturers to as-

faster butt welding

good acid neutralizing

longer storage with safety

rust inhibitor coating

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Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000 in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
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Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.

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sist in setting up a special type of specification. A committee was formed and each company interested contributed sufficient funds to perform the necessary experimental work. As a result of the work of this group, the specification was adopted by the industry, and in 1954, having served its purpose, the committee was dissolved. At this time, 1952, **The Wire Association** became a member of the American Society for Testing Materials, with representation on Committee B1, Subdivision 4, the idea being to have representation for our Insulated Wire Section in that association.

★ ★ ★

In 1953, the Directors authorized the establishment of an Electric Wire and Cable Section of the Non-Ferrous Division of the Association. The organization of our Electric Wire and Cable Section brought up the question of its relationship to the National Electric Manufacturers Association; and in 1954, as a result of a meeting with the officers of the Wire and Cable Committee of NEMA, it was agreed between the associations that so long as **The Wire Association** operated as a production organization, as specified in its Constitution and By-Laws, NEMA would cooperate in every way to assist in making our operation successful. This they have done by supplying us with very interesting and helpful information from time to time.

★ ★ ★

For the past two years, we have been developing the Electric Wire and Cable Section of the Non-Ferrous Division, with a result that today we have 162 plants in this industry with Wire Association members. In addition, in this group we also have 12 foreign companies, plus 9 in Canada and 6 in Mexico, giving us a group of insulated wire and cable manufacturers totaling 189 plants.

★ ★ ★

Our objectives are different from that of any other society in the electric wire industry, as we work only with production men on

production problems, while other societies primarily devote their efforts to the formulation of standards, sales policies and so forth.

Regional Meetings

The first Regional Meeting of the Association was held at Pittsburgh, Pennsylvania, at the suggestion of **Mr. A. R. Zapp** of the **Firth Sterling Steel Company,** who acted as Chairman of the meeting.

★ ★ ★

The idea was to reach a group of men who would not ordinarily attend national conventions. There were 185 present at the meeting, and as a result it was decided to go ahead with annual Regional Meetings.

★ ★ ★

The first Regional Meeting of a Non-Ferrous Group was held in Waterbury, Connecticut, in September 1952, with an attendance of 223.

★ ★ ★

The first Pacific Coast Regional Meeting was held in San Francisco in 1943, with an attendance of 25. And the following year the first Los Angeles meeting was held with an attendance of 60.

★ ★ ★

An agreement was reached by the Los Angeles and San Francisco groups to hold the Pacific Coast Regional Meetings alternately, at San Francisco and Los Angeles.

★ ★ ★

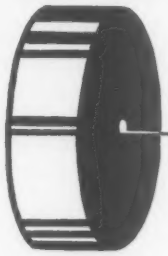
These meetings have now developed to a point where very complete programs are presented, and the attendance has grown to 270 in Los angeles in 1956, and 208 in San Francisco in 1957.

★ ★ ★

These meetings serve a very definite purpose of broadening the influence of the Association on a national basis among men who, ordinarily, would not be able to attend the national convention.

★ ★ ★

In 1952, rules and regulations governing the handling of such meetings by local committees were published in booklet form and are furnished, each year, to the mem-



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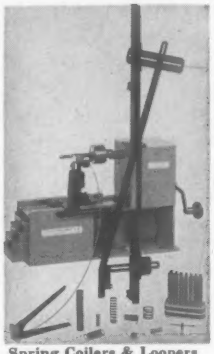

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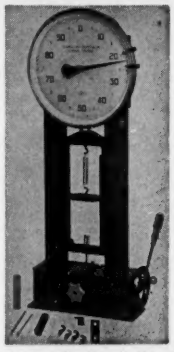

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bers of the local committees.

★ ★ ★

In 1954, **Mr. Leonard C. Crewe** proposed the issuance of 25-year Membership Certificates, and since this was the Silver Anniversary Convention, such certificates were presented for the first time and are now presented annually.

Finances

The financial history of the Association is interesting. It was organized during the depression and, during the first two years of its existence, the dues provided a working fund of only about $500 a year; the balance of the costs were absorbed by **Wire and Wire Products.**

★ ★ ★

Until October 1945, the Association operated on an annual deficit basis, the necessary funds to operate the Association being contributed by **Wire and Wire Products** each year.

★ ★ ★

In 1946, the Association showed a small balance in the treasury for the first time—and from that point on, this has slowly, but surely, increased each year to a point where we now have $8,900.49 in the treasury.

★ ★ ★

At the present time **The Wire Association** has a membership of 1,282, representing 755 companies. Of the 755 companies, 524 are wire mills and 231 are suppliers.

★ ★ ★

Included in the total membership of 1,282, we have 82 Canadian members, 8 members in Mexico, and 140 members in 38 other foreign countries.

Conclusion

No history of **The Wire Association** would be complete without some recognition to those men who, in the early days of the Association, contributed time and effort towards building it.

★ ★ ★

To such men as **Ken Lewis, George Hartley, Lee Vaughn, Fred Crapo, Bucky Buchanan, Ralph**

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Clifford, Dutch Westphal, Gus Zapp, Randolph Miller, Ernie Clark, Clem McGowan and many others, our appreciation should be extended, for in the early days these men gave freely of their time and effort to help build an efficient Association.

* * *

The importance of the wire industry to the economy of the United States can best be understood when you consider that there are over 160,000 uses for wire in industry and the home. In every activity of industry and government wire plays some part. The airplane, the automobile, the battleship, the railroad train—and practically everything found in the home from the telephone to the electric appliance—all rely on wire as an essential component to its operation.

* * *

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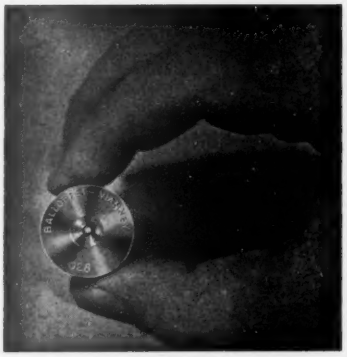

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the many end uses to which wire is put. And it is to men like yourselves, who are on the production side of the business, that the success of these operations is attributable.

★ ★ ★

This record of the Association would not be complete without a tribute to **Mrs. Ruth S. Spengel** for her unflagging devotion and loyalty. She has been with the Association from the time of its organization and her work in its behalf has been of immeasurable value in building our organization to its present position of stature and influence.

Crystallography of Cold Drawn Music Wire

(*Continued from page* 66)

preferred orientation data were taken with an X-ray diffractometer and associated counting, scaling, and recording circuits. The radiation source was cobalt K-alpha.

★ ★ ★

In order to obtain sufficient area for use in the diffractometer, a number of short lengths of wire were cemented together and then mounted in bakelite for cutting and polishing. The surface of each specimen was cut at some specific angle with respect to the axes of the wires, metallographically polished, etched to remove the cold worked layer resulting from the cutting operation, and then lightly polished.

★ ★ ★

The results showed that the preferred orientation increased with increased reduction of area by drawing until a diameter of 0.047 inch was reached. Further drawing caused a sharp decrease in the degree of preferred orientation so that the value for the 0.039 inch wire was only slightly greater than that of the patented material.

★ ★ ★

Young's modulus of elasticity was determined for 18-in. lengths of wire in the drawn condition at

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eight stages of reduction. The data were obtained by direct static loading in a vertical plane. Strain was measured with two Tuckerman extensometers mounted opposite each other on the specimen. Mounting in this manner automatically compensated for any bending of the specimen during the initial loading. Ten to twelve additions of load were made on each wire being tested, and the increments of strain were obtained by averaging the reading of the two extensometers after each addition of load.

★ ★ ★

The value of Young's modulus was found to rise to a maximum with wire of 0.047-in. diameter and thereafter to decrease as did the preferred orientation. The development of preferred orientation, therefore, seems to be the principal factor contributing to the change of modulus.

The Development of Modern Thread Rolling

(*Continued from page 78*)

broad surface of the dies whereas in other methods of threading, wear is concentrated over a sharp cutting edge. Thread form does not change with thread rolling dies since they cannot be altered by improper sharpening. Sharpening is never required. See Figure 7.

★ ★ ★

Wear on the dies is readily detected by either the entire crumbling of the crests or by spawling of entire threads.

Versatility

A large percentage of fasteners such as wood screws, self-tapping screws, machine screws, drive screws, and screwnails are produced on Thread Rolling Machines. The versatility of these machines, however, is unlimited, being capable of forming a wide variety of threads on a variety of metals and, in addition, capable of performing several non-threading operations. Jobs once considered impossible are now rolled on a commercial

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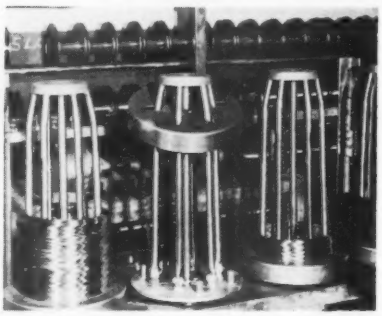
basis. For example, a flat die machine can handle special applications such as rolling two or more threads simultaneously, threading and knurling, rolling right and left-hand threads in one pass, burnishing and form rolling. See Figure 8.

New Wire Swifts Developed

The Stow Manufacturing Co., 443 State St., Binghamton, N. Y., has developed a swift for paying out wire said to embody important new features.

★ ★ ★

It is of all-metal construction, with needle bearings that provide



Stow Swifts.

freedom from play. An aluminum base and tip make it light in weight, the base having slats that allow for adjustment of the vertical rods to accommodate coils with a range of diameters of from 7" to 8½". Up to 19½" of wire may be placed on the swift. The round rods avoid possibility of wire damage due to sharp edges. A hub is provided in the base for the installation of a brake, if it is wanted.

★ ★ ★

Full details are available from the manufacturer upon request.

Hubbard in Production on New Plastic Spools

Hubbard Spool Company Garrett, Ind., who recently installed injection molding equipment, is now in production on a new type of plastic non-returnable spool for the magnet wire and related industries.

★ ★ ★

New 3" and 6" spools were initially produced and tested in various wire plants, where they met with acceptance and approval. Other sizes and types will be available soon.

★ ★ ★

This type of spool was designed specifically for low-cost, non-returnable shipping purposes. The spools are made to high standards of accuracy for the quality winding of wire in fine gauges.

★ ★ ★

The company will produce standard sizes and types and is in a position to make spools to special specifications. Full details may be secured by writing to Hubbard Spool.

Driver's West Coast Wire Mill Opened

The Wilbur B. Driver Company of Newark, N. J., recently celebrated the formal opening of its new West Coast alloy wire mill in Santa Maria, California. **Edwin J. Jakielski** has been appointed Plant Manager. His experience covers production, engineering and sales work during twenty years with the company.

★ ★ ★

This new facility will produce fine resistance wire, (bare and enameled,) and stainless steel wire to better serve the Company's West Coast customers.

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Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Illinois

FURNACES—Resisting Heating, Strand
Electric Furnace Company, Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Illinois

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Strand Annealing
Electric Furnace Company, Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Illinois

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GEARMOTORS—
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS —
Bakelite Company Div. of Union Carbon & Carbide Corp., New York, N. Y.
Blane Corporation, The, Canton, Mass.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Discillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Bobbin Winders
Cedar West Tool Company, Inc., New York, N. Y.

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Shelton, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Closing Rope
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling & Rewinding Steel Strip
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Herborn, Maschinenfabrik, Herborn, Germany
Morgardshammer Mek Verstads A. B., Morgardshammer, Sweden.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Patterson Machine, Geo. C., Co., Cleveland, Ohio

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Company, Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Maschinenfabrik, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven, Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Nilson, A. H. Machine Co., Shelton, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Galvanizing Wire
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Gang Slitting
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Hydraulic
Manco Mfg. Co., Bradley, Illinois

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Beard Machine Co., York, Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Company, Inc., New York, N. Y.
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Godderidge Ste., Houilles (Seine-et-Oise), France

MACHINERY—Plating
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Polishing Asbestos Wire
Beard Machine Co., York, Pa.

MACHINERY—Printing on Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Re-Spooling
Colbourne Machine Company, Winsted, Conn.
Emory Company, Robert J., Newark, N. J.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Industrial Winding Machinery Co., New York, N. Y.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Company, Cleveland, Ohio
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Scrubbing, Steel Strip
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Slitting Metal
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Spark Testing
Davis Electric Co., Wallingford, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Splicing (Strip)
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Staple
Nilson, A. H. Machine Co., Shelton, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting
Breitenbach, Wilhelm, Unna, Germany
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Straightening (Strip Leveling)
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Stranding
Godderidge Ste., Houilles, (Seine-et-Oise), France
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Breitenbach, Wilhelm, Unna, Germany
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf. Germany
Litzler, C. A., Co., Inc., Cleveland, Ohio
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Godderidge Ste., Houilles (Seine-et-Oise), France
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Manco Mfg. Co., Bradley, Illinois
National Electric Welding Machines Co., Bay City, Michigan
Schlatter, H. A., Ltd., Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Industrial Winding Machinery Co., New York, N. Y.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Breitenbach, Wilhelm, Unna, Germany
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammer Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
National Mach'y Exch. (Used), New York, N. Y.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Nilson, A. H. Machine Co., Shelton, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. — D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.

PAPER—Insulating
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PATENT—ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.
Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

PLASTICS COMPOUNDING—Custom
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
Bakelite Company Div. of Union Carbon & Carbide Corporation, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

PRINTING WHEELS—for Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Evans, George, Corp., Moline, Ill.
Hubbard Spool Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Steel, for Rope and Cable
Evans, George, Corp., Moline, Ill.

REELS—Strip Steel
Steel Equipment Company, Cleveland, Ohio

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Boonton Molding Company, Boonton, N. J.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Nilson, A. H. Machine Co., Shelton, Conn.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Aluminum
Aluminum Company of America, Pittsburgh, Pa.

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Aluminum Company of America, Pittsburgh, Pa.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SHEARS—Wire, Rod, Billet
Manco Mfg. Co., Bradley, Illinois

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Plastic
Boonton Molding Company, Boonton, N. J.
Hubbard Spool Company, Garrett, Indiana
Standard Mill Supply, Co., Pawtucket, R. I

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRAIGHTENERS—Portable Rod
Manco Mfg. Co., Bradley, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TABLES—Press Feeding
Jarke Manufacturing Co., Chicago, Illinois

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.
National Electric Welding Machines Co., Bay City, Michigan
Schlatter, H. A., Ltd., Zurich, Switzerland
Strecker, August, K.G., Limburg/Lahn, W. Germany

WHEELS—for Printing on Electric Wire
Gem Gravure Company, West Hanover, Mass.

WIRE—Aluminum
Aluminum Company of America, Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
National Standard Company, Niles, Mich.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
Aluminum Company of America, Pittsburgh, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

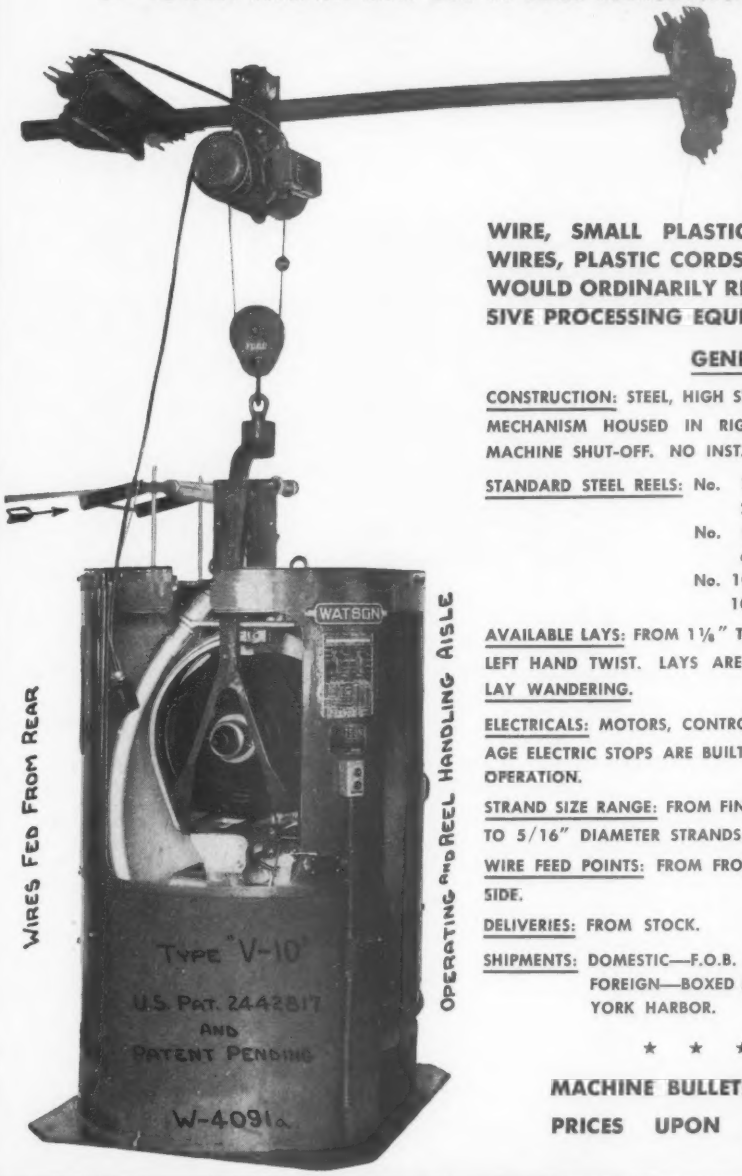
WATSON

VERTICAL BUNCHERS TYPE "V"

THE LEADING DESIGNS WITH AN INTERNATIONAL REPUTATION

NOTABLE ADVANTAGES:

1.—HIGHEST LONG-RUN OUTPUT ON LARGE STANDARD WIRE REELS.
2.—GREATEST COMPACTNESS. IDEAL FOR ROW GROUPING IN LIMITED SPACE.
3.—LABOR-SAVING. ONE OPERATOR CAN SERVE MANY MACHINES.
4.—QUICKEST PARTS SERVICE FROM CATALOGUED STOCK.
5.—LOWEST MACHINE COST DUE TO MASS MANUFACTURE.



SUITABLE FOR ALL COMMON BUNCHING WORK, AND USED ALSO FOR BUNCH-STRANDING AND CABLING OF STEEL AND ALUMINUM CLOTHESLINE, TELEVISION GUY WIRE, SEALING STRANDS, METAL FISH LINES, PAPER CORD, CONTINUOUS TWISTS OF FLAT WIRE, SMALL PLASTIC INSULATED CABLES, ANNUNCIATOR WIRES, PLASTIC CORDS, AND MANY OTHER PRODUCTS WHICH WOULD ORDINARILY REQUIRE THE USE OF MUCH MORE EXPENSIVE PROCESSING EQUIPMENT.

GENERAL SPECIFICATIONS

CONSTRUCTION: STEEL, HIGH STRENGTH ALLOYS AND BALL BEARING THROUGHOUT. MECHANISM HOUSED IN RIGID STEEL FRAME WITH SAFETY DOOR OPENING MACHINE SHUT-OFF. NO INSTALLATION WORK REQUIRED.

STANDARD STEEL REELS: No. 7—16" x 8", 250 LB. CU. CAPACITY
No. 9—22" x 11", 650 LB. CU. CAPACITY
No. 10—24" x 14", 1000 LB. CU. CAPACITY

AVAILABLE LAYS: FROM 1⅛" TO 4⅞". RIGHT AND LEFT HAND TWIST. LAYS ARE FIXED AS SET. NO LAY WANDERING.

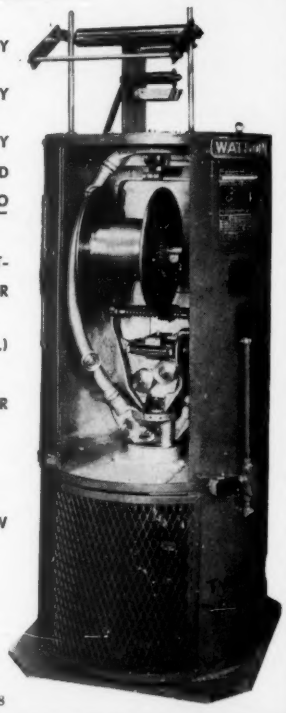
ELECTRICALS: MOTORS, CONTROLS AND LOW VOLTAGE ELECTRIC STOPS ARE BUILT IN AND WIRED FOR OPERATION.

STRAND SIZE RANGE: FROM FINE (7 x #30 B. & S.) TO 5/16" DIAMETER STRANDS.

WIRE FEED POINTS: FROM FRONT, REAR OR EITHER SIDE.

DELIVERIES: FROM STOCK.

SHIPMENTS: DOMESTIC—F.O.B. PATERSON, N. J.
FOREIGN—BOXED & DELIVERED TO NEW YORK HARBOR.



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MACHINE BULLETINS AND PRICES UPON REQUEST

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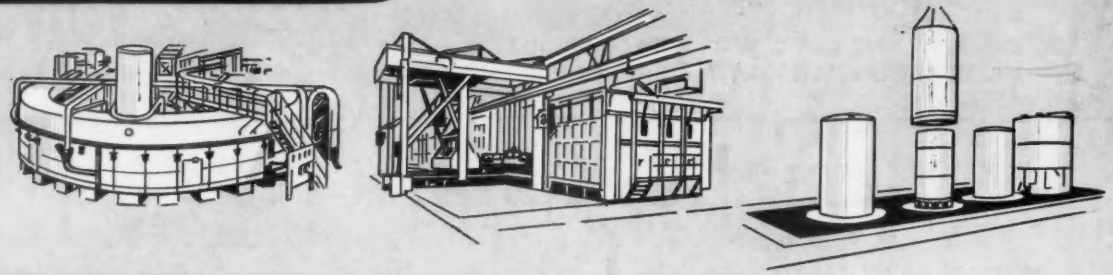
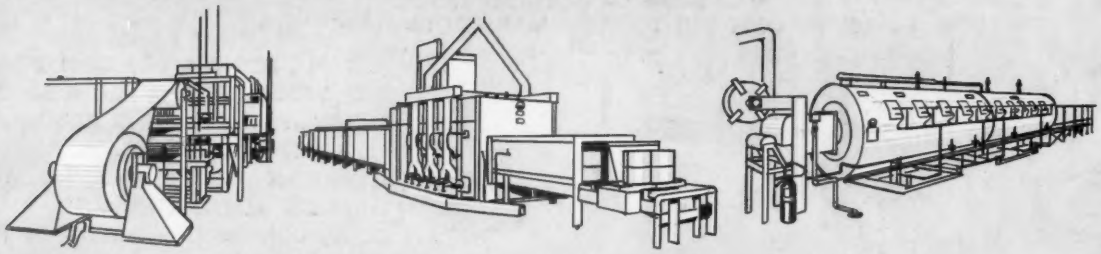
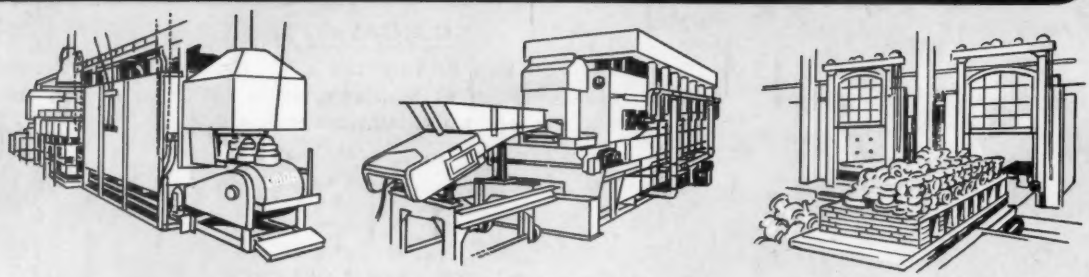
EF BUILDS



ALL TYPES AND SIZES



GAS FIRED, OIL FIRED and ELECTRIC



including the one that's best for you

It costs less to let experienced heat treating engineers handle all phases of your heat processing furnace projects. Then you can be sure the design and type of furnace, the method of heating, the special atmosphere, the material handling and other equipment are all best suited for your plant, product and process. All phases can be synchronized and coordinated to your production schedules, assuring the utmost economy and efficiency, and profitable, trouble-free operation.

With more than 40 years of continuous research and experience, and thousands of successful gas fired, oil fired and electric installations, EF engineers are qualified to design and build the sizes and types you need for any heat processing requirement.

On your next furnace project, no matter how large or unusual, let EF engineers work with you. Our wide experience and complete research, engineering, manufacturing and erection facilities are "at your service."

EF

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
FOR ANY PROCESS, PRODUCT OR PRODUCTION

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